Colorado River Basin Salinity Control Program
Federal Accomplishments Report for Fiscal Year 2017

Presented to

Colorado River Basin Salinity Control Advisory Council

by

United States Department of Agriculture
Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Geological Survey
Bureau of Land Management
Bureau of Reclamation

October 2017

Colorado River Basin Salinity Control Program
Federal Accomplishments Report for Fiscal Year 2017
Acronyms and Abbreviations

Advisory Council	Colorado River Basin Salinity Control Advisory Council
ASCS	Agricultural Stabilization and Conservation Service
Basinwide Program	Basinwide Salinity Control Program
BLM	Bureau of Land Management
BSP	Basin States Program
CAP	Central Arizona Project
CDPHE	Colorado Department of Public Health and Environment
CRBSCP	Colorado River Basin Salinity Control Program
CRSS	Colorado River Simulation System
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
FAIRA	Federal Agricultural Improvement and Reform Act
FOA	Funding Opportunity Announcement
Forum	Colorado River Basin Salinity Control Forum
FSRIA	Farm Security and Rural Investment Act
FY	Fiscal Year
GGNCA	Gunnison Gorge National Conservation Area
GIS	Geographic Information System
HDB	Hydrologic Date Base
NCA	National Conservation Area
NIWQP	National Irrigation Water Quality Program
NRCS	Natural Resources Conservation Service
Reclamation	Bureau of Reclamation
RMP	Resource Management Plan
Service	U.S. Fish and Wildlife Service
TDS	Total Dissolved Solids
TMS	Technical Modeling Subcommittee
USDA	United States Department of Agriculture
USGS	U.S. Geological Survey
UVWUA	Uncompahgre Valley Water Users Association
Work Group	Colorado River Basin Salinity Control Forum's Work Group

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Environmental Protection Agency (EPA)
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During Fiscal Year 2017, EPA continued to provide coordination and assistance to the Colorado River Basin Salinity Control Forum and Advisory Council involving salinity control activities. Several key items;

- EPA Water program staff, including permitting staff from the three EPA Regional Offices, provided federal NPDES permit updates and input to the workgroup preparing the 2017 Review of the Water Quality Standards for Salinity in the Colorado River System.

- EPA provided informational updates to the Forum and Advisory Council including updated State and Tribal Water Quality Standards and related program information.

- EPA continues to participate as a Cooperating Agency in the Bureau of Reclamation's effort to prepare an Environmental Impact Statement for the Paradox Valley Salinity Control Unit. The Regional Salinity Control Coordinator as well as Underground Injection Control program and National Environmental Policy Act staff are actively participating in this important effort.

- EPA Region 8 has continued the lead role for EPA Regions 6 and 9 for coordination with the Forum and Advisory Council and continues to be available for responding to questions, requests, and other needs.

The attached table indicates the current status of all the Colorado River Basin States in adoption of the Colorado River Basin Control Forum's salinity standards (Policies and Plan of Implementation).

EPA has approved the applications of five Tribes within the Colorado River basin for "treatment in a manner similar to a state" (TAS) to administer the Water Quality Standards (WQS) and §401 Certification programs on their respective tribal lands, and four tribes have approved WQS. Specifically;

• The WQS for the **Ute Mountain Ute Tribe** were approved by EPA Region 8 on October 19, 2011. It is anticipated that over the next year the Tribe will do a WQS triennial review. The Tribe has salinity and selenium standards and has several on-going selenium and salinity projects examining potential effects on groundwater, irrigation and endangered species in Tribal and downstream waters.

• The **Hualapai Tribe** adopted revised WQS in July 2009, including the 2008 Forum Policies and Plan of Implementation. These revised standards were approved by EPA Region 9 September 25, 2009.

• The **Navajo Nation** adopted revised WQS in May 2008 that included the 2005 Forum Policies and Plan of Implementation; the revised WQS were approved by EPA in March

2009. They have developed draft WQS that refer to the 2011 Forum WQS and conducted their public process on this revision but have not yet completed their action to adopt.

- The **Hopi Tribe** included the 2005 Forum Policies and Plan of Implementation in WQS revisions which were adopted by the Tribe March 21, 2011, and approved by EPA August 24, 2011.

- The **Havasupai Tribe** received its TAS approval on April 26, 2011; EPA Region 9 is working with the Tribe in completing development of their WQS.

The adopted and approved WQS for the four Tribes have been published and are available for review on-line.

The **Southern Ute Tribe** has submitted their WQS TAS application this past year. It is currently under review. If/when their WQS TAS application is approved, they will hold another WQS hearing, and submit to EPA for CWA action. If/when approved, their WQS will also become a part of the Forum's review.

Table 1 - COLORADO RIVER BASIN SALINITY CONTROL STANDARDS UPDATE

Basin States Adoption of Salinity Standards & Plan of Implementation Updates
September 2017

EPA Region – State	2005 Update Adopted[1] by State	2005 State Adoption Approved by EPA	2008 Update Adopted[1] by State	2008 State Adoption Approved by EPA	2011 Update Adopted[1] by State	2011 State Adoption Approved by EPA	2014 Update Adopted[1] by State	2014 State Adoption Approved by EPA
R9 – Arizona	Yes 12/02/08	Yes 1/21/09	In draft	--	In draft	--	Yes 10/18/16	12/23/16
R9 – California	Yes 2/01/06	Yes 3/16/06	Yes 8/04/09	Yes 3/09/10	In draft	--	Yes 5/05/15	
R9 – Nevada	Yes 9/06/06	Yes 4/05/07	Yes 10/05/10	Yes 6/15/11	Yes 10/11/12	Yes 2/12/13	In Draft[2] Dec. 2017	
R8 – Colorado	Yes	Yes	Yes 12/08/08	2005 adoption reaffirmed	Yes 12/12/11	2008 adoption reaffirmed	Yes 12/8/14	
R8 – Utah	Yes 10/22/08	Yes 9/30/09	Yes 10/22/08	Yes 9/30/09	Yes 4/1/12	Yes 11/20/12	Partial[3] 8/15/14	
R8 – Wyoming	Adopted by reference – Water Quality Rules and Regulations (1982)						Yes[4] 3/23/15	
R6 – N. Mexico	Yes – by reference in WQS	Yes	Earlier version not changed	April 2011	Earlier version not changed	Previously approved with adoption by reference	Partial[5] 9/13/15	8/11/2017

[1] Adopted/Approved – Some states chose not to adopt Forum Standards during previous review periods because the salinity standards had not changed significantly.
[2] Nevada will also adopt a measure to automatically adopt future salinity standards updates unless the State Environmental Commission disapproves the revisions.
[3] Utah released the 2017 Review for public comment. Comments due 8/25/2017.

[4] Adopted criteria and (by reference) the implementation policies in State permit regulations. 2017 Forum Review referenced on State website. http://deq.wyoming.gov/wqd/surface-water-quality-standards-2/

[5] New Mexico will cooperate with the Colorado river basin states and the federal government to support and implement the salinity policy and program outlined in the most current "review, water quality standards for salinity, Colorado river system" or equivalent report by the Colorado river salinity control forum.

Fish and Wildlife Service (Service)
Colorado River Basin Salinity Control Program
Fiscal Year 2017

During Fiscal Year 2017, the Service continued to provide coordination and assistance to the Colorado River Basin Salinity Control Forum and Advisory Council involving salinity control activities. We look forward to providing the same coordination in FY 2018. Note that the FWS Salinity Coordinator position changed hands mid-year; Creed Clayton replaced Barb Osmundson after she retired at the end of March, 2017.

Summary of 2017 Fish and Wildlife Activities-At a Glance

1. Salinity Control Meeting attendance

   a. Forum, Workgroup, and Advisory Council
      - Moab, UT 2016.10.24-27
      - San Diego, CA 2017.2.8 (called in)
      - Salt Lake City, UT 2017.4.19-20
      - Jackson, WY 2017.6.7-9
      - Farmington, NM 2017.9.12-14

   b) Paradox cooperating agency meetings
      - Grand Junction, CO 2017.4.12
      - Grand Junction, CO 2017.1.18

2. Environmental Documents

   a. Environmental Assessment Review
      - Sheep Creek Irrigation Company replacement of 3.5 miles of Antelope and N. Laterals salinity control project and associated Wildlife Habitat Replacement (WHR) Project

   b. Endangered Species Act Consultations
      - Cattleman's Ditch Phase II Pipeline Project (Reclamation)
      - Fire Mountain Canal Pipeline Project (Reclamation)
      - Orchard Mesa Wildlife Area Habitat Replacement Project (Reclamation)

   c. Water Quality Assessments
      a. Memo to Reclamation regarding water selenium (Se) concentrations at WHR sites--previously created WHR sites are "grandfathered" under current Colorado Department of Public Health and Environment (CDPHE) standard of 4.6 ug/l dissolved Se (as opposed to new EPA Se standard)
      b. Review water quality results, with a focus on Se, for Peters ponds (old razorback sucker grow-out ponds) at Grand Junction Wildlife Area (Reclamation).

d. Review and compile M&E reports from UT, WY, and CO for status of Wildlife Habitat Replacement progress and credits

3. Wildlife Habitat Replacement Activities

a. Wildlife Habitat Replacement (WHR) Project Site Visits
   - Grand Valley Salinity Control Unit (SCU)
     - Grand Valley (5 Colorado Parks and Wildlife (CPW) Wildlife Areas), with NRCS, 2016.10.31
     - Grand Junction Wildlife Area, with BOR, 2017.5.11
     - DeBeque Wildlife Area, with BOR, 2017.9.26 (planned)

   - Lower Gunnison SCU
     - Orchard Ranch, proposed WHR site, near Orchard City, 2017.5.24
     - Bostwick Park, Billy Creek State Wildlife Area, near Ridgway, 2017.6.16
     - Roubideau ponds, Escalante State Wildlife Area, near Delta, 2017.7.10

   - Price-San Rafael SCU
     - Olsen Reservoir, potential WHR site on BLM land near Price, 2016.10.3 and 2017.4.2

   - Paradox Valley, potential salt landfill sites and evaporation ponds, 2016.10

b. Wildlife Habitat Replacement Project Meetings, Presentations
   a) Call with salinity workgroup science team regarding WHR projects on BLM lands, 2016.9.14
   b) Call with NRCS regarding Delta Duck Club WHR project, 2016.9.22
   c) Met with Reclamation regarding weed treatments at Orchard Mesa Wildlife Area, 2016.9.27
   d) Met with Reclamation and CPW on mosquito control at WHR sites, 2016.10.20
   e) Call with Reclamation (Provo) regarding WHR scoring for irrigation project impacts and specific WHR proposals in UT and WY, 2016.10.20
   f) Presentation, along with Reclamation, to Colorado Conservation Corps on Salinity Control Program and WHR, 2016.11.8
   g) Call with Reclamation (Provo, SLC) regarding canal flood control
   h) Met with Reclamation regarding pipe replacement at the Colorado River Wildlife Area 2016.12.16
   i) Met with Reclamation and Colorado Audubon regarding food plots and selection of shrubs and trees to be planted on Grand Junction Wildlife Area, 2017.1.25
   j) Met with Reclamation on WHR project acre credit calculations, 2017.1.31
   k) Met with Reclamation, BLM, and/or NRCS about WHR on public land in general, and specifically for:
      1. Olsen Reservoir potential WHR site on BLM, 2017.2.2

2. Gunnison River potential WHR site on BLM for Delta ditch piping, 2017.5.22 and 2017.7.17

l) Call with Reclamation, USGS, and BLM regarding potential salt disposal sites in Paradox Valley, 2017.9.18

m) Lower Gunnison Basin Selenium Management Program meetings
1. Delta, CO 2016.12.2
2. Delta, CO 2016.11.14
3. Delta, CO 2017.3.28

4) Trainings and Conferences
a) Colorado River Water Conservation District Annual Seminar, Grand Junction, 2017.9.15
b) Desert Rivers Collaborative meeting, 2016.6.16

Expanded Discussion of Select Items Listed Above

Endangered Species Act Section 7 Consultations. In accordance with section 7 of the Endangered Species Act (ESA) of 1973, the Service Salinity Coordinator conducted section 7 consultations on various ditch-to-pipeline salinity control projects in the Lower Gunnison SCU. Consultation was also conducted on a habitat improvement project at a WHR site in the Grand Valley SCU. Projects such as these typically involve varying levels of effects to: the four endangered fish of the Colorado River (Colorado pikeminnow, razorback sucker, humpback chub, and bonytail) through downstream water depletions; Gunnison sage-grouse critical habitat adjacent to agricultural areas; and/or the western yellow-billed cuckoo, which occurs in riparian habitats along major rivers—sometimes overlapping with WHR projects. Salinity control projects affecting these or other threatened or endangered species in Utah or Wyoming would undergo section 7 consultation with the respective Fish and Wildlife offices in those states.

The most recent (2014) species to be added to the endangered species list that occur in or near SCUs are the western yellow-billed cuckoo and Gunnison sage-grouse. Both of these species occur in the upper basin states of Colorado, Utah, and Wyoming (cuckoo only). These species need to be considered in any environmental documents associated with salinity control projects and habitat replacement projects, including National Environmental Policy Act (NEPA) analyses, as well as in ESA section 7 consultations. Although found not warranted for listing in 2015, the greater sage-grouse is also a species of concern that needs to be considered when planning salinity control and WHR projects. Priority areas of conservation for the greater sage-grouse overlap with salinity control units in Wyoming and Utah.

Water diversions and depletions from the Colorado River Basin adversely affect downstream endangered fish. Alternatively, the return of water saved through increased water delivery and irrigation system efficiencies would benefit endangered fish found downstream. When possible, we recommend this beneficial use for endangered fish. Because a significant amount of water is being diverted outside of the Colorado River Basin via trans-mountain diversions, the return of any water to river segments occupied

by these endangered fish would be a benefit to them. Along with this, a continued request from the Service is to have more explanation in environmental documents from Reclamation and NRCS about what happens to the water savings from reduced seepage and water use associated with salinity control projects. If there are at least no additional water depletions from a salinity control project, information that would be useful in documenting this would include: no new land would be irrigated, no new water storage would occur, the growing season would not be extended, there would be no change in crop type (or if change in crops, they would require less water), and no additional water would be applied to existing crops (e.g., to get full water right). If there are reduced river diversions, or greater return flows, it would be helpful to explain this beneficial effect, and it could streamline the consultation effort.

Paradox Valley Salinity Control Unit. The Service remains engaged as a cooperating agency with Reclamation on the Paradox EIS. The Service Salinity Coordinator provides input on the potential effects to listed species (Gunnison sage-grouse) and migratory birds from the various EIS alternatives. Avoidance, minimization, and conservation strategies for these species are shared as well. We remain concerned about the difficulty of minimizing hazards to migratory birds presented by one of the EIS alternatives.

Wildlife Habitat Replacement Activities. The Service truly appreciates the on-going efforts of Reclamation and NRCS staff to replace wildlife habitat values forgone.

Orchard Ranch WHR Project (Lower Gunnison SCU). A new WHR project was proposed on the Orchard Ranch in Delta, County, Colorado. The proposed site is adjacent to an existing WHR project on the ranch. Habitat value scoring and habitat improvement options were discussed at a site visit.

Grand Valley WHR Project (Grand Valley SCU). The Service Salinity Coordinator continues to track progress on the Grand Valley Wildlife Replacement Project, which involves non-native vegetation removal and habitat improvement at five Colorado Parks and Wildlife properties near Grand Junction. Phase I of this project, which involved mechanical removal of Tamarisk and Russian olive, was completed in March, 2015. Phase II involves treatment of annual weeds and tamarisk resprouts with herbicide. Herbicide applications were done in the spring and fall of 2015 and 2016. Phase III involves revegetation, including willow and cottonwood starts. Although the project was planned to be complete by the end of 2016, poor recruitment of the plantings may necessitate additional revegetation efforts. This project will eventually bring the Grand Valley unit to 100 percent of the concurrent acreage replacement goal.

Monitoring and Evaluation Report Review--NRCS Wildlife Habitat Projects. After review of the NRCS 2016 M&E reports for Wyoming, Colorado, and Utah, the Service Salinity Coordinator assessed the progress of NRCS in replacing fish and wildlife habitat forgone as a result of implementing salt control measures. Tables 2-4 display updated summaries to evaluate and compare SCU's and determine whether wildlife habitat replacement is concurrent and proportional with the acres lost due to salt control projects completed to date.

Wyoming. See Tables 2 and 3. In 2005, the Big Sandy SCU in Wyoming was determined to be concurrent with wildlife habitat replacement acres, with the replacement goal exceeded by about 10.8 acres. However, loss of water in a 40-60 acre wetland near Eden, Wyoming was identified in 2014. This pond remained dry until 2016, when it once again retained water. Loss of this wetland was not identified or analyzed in the EIS. This incident identified a need to assure that acres of habitat replacement are still functioning as intended, and that replacement credits are still proportional and concurrent before any SCU is officially closed out. NRCS in Wyoming, along with partners, is planning a project-wide assessment to determine if other habitat has been lost or gained in order to determine if wildlife replacement is "concurrent and proportional for the Big Sandy SCU."

For the Henrys' Fork SCU, due to lack of opportunity for traditional wetland replacement project opportunities, alternative habitat improvement projects have been pursued and scored with a new habitat replacement calculation tool. The Beaver Creek Diversion Improvement project, including fish passage, was completed in 2016. The Peoples Canal Fish Barrier had been completed previously. Two more projects are planned, listed in Table 2. The total habitat values lost thus far was previously reported at 28.3, and the total habitat values replaced are 193. Thus, the Henry's Fork SCU appears to be proportional and concurrent with wildlife habitat replacement, although there is some question as to what amount is required to be concurrent at this time.

Table 2 - Alternative Habitat Replacement Projects and Values for the Henry's Fork SCU

Name	Habitat Value	Replacement Value Totals
Peoples Canal Fish Barrier	100 stream miles protected	178.2
Beaver Creek Riparian Fencing	18.48 acres excluded from grazing	60 estimated
Blue Bell Diversion Improvement with	35 stream miles seasonally connected	87.3 estimated
Beaver Creek Diversion	6 stream miles seasonally connected	14.9 (completed in 2016)

Colorado. See Table 3. For the state of Colorado, ongoing field inventory demonstrated that the Mancos Valley wildlife habitat replacement is proportional and concurrent and has now exceeded the current wildlife habitat replacement goal by 194 percent. Ongoing field inventory confirmed that 107 acres are still maintained. There is sufficient replacement to account for almost all the acres needed for a full project implementation of 108 acres of wildlife habitat improvements. Wildlife habitat replacement is also concurrent in the Lower Gunnison SCU, with the establishment of approximately 105 percent of the acres currently needed. In FY2016, 35 acres of additional habitat replacement was established and no wildlife habitat acres were lost. Additional efforts continue to be made through wildlife only sign-ups, with various conservation groups, and with Federal and State agencies. An issue identified with the lower Gunnison SCU, however, is that only small parcels are currently available for habitat projects. These small projects are complex in planning and habitat enhancement options, and they provide relatively small acreages per project. A goal of NRCS is to encourage larger habitat replacement projects with better connectivity and a longer-term life expectancy.

In the Grand Valley SCU, the wildlife habitat replacement goal is 1,206 acres including the DeBeque and Whitewater irrigation improvements. For Fiscal Year 2016, there were no new acres of wildlife habitat replacement applied and 4 acres of previously reported replacement wildlife habitat were reported as lost. To date, a total of 774 acres of suitable salinity wildlife habitat replacement or 64 percent of the original wildlife habitat replacement goal has been established and is being maintained. With planned and funded wildlife replacement projects in the Grand Valley SCU, including additional acres currently under contract, the Grand Valley SCU is expected to meet and exceed replacement acreage goals by approximately 100 acres in the near future and become proportional and concurrent.

Wildlife replacement acreage in the McElmo Creek SCU is at 280 acres or 87 percent proportional and concurrent. Results from a few years ago indicated that previously reported habitat improvements may have been lost due to development and other land-use changes. There was a drop from an estimated 451 acres down to 204 acres after ½ of the replacement sites had been surveyed. It was reported that the on-going habitat assessment may not be able to track all habitat projects previously reported due to changes in staff and missing inventory data. It was noted that several upland acres were also acquired in the McElmo Project area, but it was unknown whether the upland habitat could meet suitable replacement requirements, and thus was not included in the initial totals. Nevertheless, field inventory confirmed that the 280 reported acres are suitable salinity wildlife habitat replacement acres, they are still being maintained, and they can be tracked.

The Silt SCU replacement goal is 40 acres of riparian/upland wildlife habitat and 10 acres of wetland wildlife habitat developed or significantly enhanced. For FY2016, there were no new acres of wildlife habitat replacement applied. To date, 19.4 acres of suitable salinity wildlife habitat replacement or 61 percent of the concurrent wildlife habitat replacement goal and 39 percent of the full project cumulative wildlife habitat replacement goal have been established and are being maintained. An ongoing issue identified with the Silt SCU is that there are only a few landowners that are interested in habitat improvement projects. Additional efforts are being made through wildlife only sign-ups, with various conservation groups, and with other Federal and State agencies to accelerate the implementation of wildlife habitat enhancement projects. Estimated wildlife habitat losses from the current salinity control improvements to date are: Wetlands – 0 acres; Riparian/Ditches – 15.7 acres.

Utah. See Table 4. For the state of Utah, NRCS associated with the Price-San Rafael, Uintah Basin, and Muddy Creek SCU's have exceeded the adopted replacement goal of 2 acres of wildlife replacement habitat per 100 acres of salt control projects, at 482 percent, 671 percent, and 234 percent respectively. The Muddy Creek Unit is relatively new, small, and with few salinity control projects completed. This has resulted, so far, in only 4 acres of WHR currently required to be concurrent and proportional; 9 acres of habitat replacement has already taken place.

Those units in Utah not concurrent with wildlife habitat replacement include the Manila-Washam and Green River SCUs. In FY 2016, no salinity related wildlife habitat

replacement took place in Manila-Washam Unit. Total habitat replacement through FY 2016 is 12 acres, or 14 percent of that required to be concurrent and proportional. In FY 2016, no wildlife habitat replacement has taken place in the Green River Unit. Total habitat replacement through FY 2016 is 0 acres of 10 acres required to be concurrent and proportional.

It should be noted here that inventories completed on habitat replacement sites may result in a reduction of acres considered habitat replacement. Major reasons for this issue provided in some of the M&E reports include urban development, changes in land management, and changes in land ownership. Most of the wildlife habitat replacement projects require time to become fully functional and reach their full habitat potential. For example, it takes a long time for planted cottonwood trees to develop into a mature gallery. Continued follow-up by NRCS is critical to support landowners with project implementation, and to assure that reported program habitat replacement goals are maintained. Any acres lost during the life of the salinity control program should be replaced to maintain a concurrent status.

Table 3 - Summary of Wildlife Habitat Replacement (WHR) in Colorado Salinity Control Units for FY 2016

Salinity Control Units	Habitat acres acquired in 2016	Habitat acres replaced, cumulative total	% concurrent (i.e., % of current WHR obligation accomplished)	Habitat acres to be concurrent by end of 2016	Remaining acres needed to be concurrent	Comments
COLORADO						
Lower Gunnison Unit	6.7 acres wetland, 28.3 acres upland	1,435 acres	107%	1,369 acres	0	68,460 salt control acres thus far. 115,000 acres salt control at full project implementation, which would require a total of 2300 acres of WHR (115,000 x 0.02 = 2300). The shift to wildlife only contracts allows field biologists to focus on high priority projects and provide flexibility to work with non-traditional producers, and to partner with other agencies.
Grand Valley	0 new 4 acres lost	774 acres	64% (100%+ with contracts)	1206 acres including Debeque & Whitewater	432 acres	To date just over 100% of salt control acreage goal has been treated with improved irrigation systems. Negotiated total habitat replacement goal of 1,206 acres. Contract under way for 104 additional WHR acres. 350 WHR acres also planned & funded on CPW land. Together these will exceed goal by approx.22 acres once fully implemented.
Mancos Valley	0	107 acres	194%	55 acres	0 for concurrent (1 for total)	To date 2,773 acres salt control (irrigation improvement acres). 5400 acres salt control at full project implementation, which would require 108 acres of WHR (5,400 x 0.02 = 108). Field inventory confirmed 107 acres are still maintained, or 99% of full project implementation.
McElmo Creek	0 acquired 0 planned	280 acres	87%	323 acres	43 acres	To date, 16,163 acres salt control projects. 21,550 acres salt control at full project implementation, which would require a total of 431 acres of WHR (21,550 x 0.02 = 431).
Silt	0	19.4 acres	61% (but replaced acres > estimated lost acres so far)	31.8 acres	12.4 acres	To date 1783 acres salt control. 2800 acres salt control at full project implementation. The 2 acre per 100 acre rate does not apply to the Silt Unit due to a BE that predicted loss of 10 acres of wetland and 40 acres of riparian/upland habitat losses (=50 acres). The Silt Unit concurrent value is based on the % of the salt treatment goal reached so far times the 50 acres of proposed wildlife habitat replacement (1,783 ac/2,800 ac = 63.6%) x 50 ac =31.8 acres to be concurrent. Estimated habitat loss so far is 15.7 riparian acres.

Table 4 - Summary of Wildlife Habitat Replacement in Utah Salinity Control Units for FY 2016

Salinity Control Units	Habitat acres acquired in 2016	Habitat acres replaced, cumulative total	% concurrent (i.e., % of current WHR obligation accomplished)	Habitat acres to be concurrent by end of FY 2016	Remaining Acres Needed to be Concurrent	Comments
UTAH						
Green River	0	0	0%	10	10	Through 2016 – 478 acres treated. 2,080 acres salt control at full project implementation, which would require a total of 42 acres of WHR (2,080 x 0.02 = 42). Insufficientl gravity pressure exists to incentivize landowners to convert to sprinklers.
Manila-Washam	0 (2 acres under contract)	12	14%	85	73	NRCS has treated 4,236 acres so far. 7780 acres salt control at full project implementation, which would require a total of 156 acres of WHR (7,780 x 0.02 = 156).
Price-San Rafael	0 (5 in active contracts)	3,365	482%	698	None (2667 acre surplus)	To date 33,526 acres salt control. 36,050 acres salt control at full project implementation, which would require a total of 721 acres of WHR (36,050 x 0.02 = 721).
Uintah Basin (amended)	0 (5 in active contracts)	21,349	671%	3,184	None (18,165 acre surplus)	To date 159,190 acres salt control. 160,000 acres salt control at full project implementation, which would require a total of 3,200 acres of WHR (160,000 x 0.02 = 3,200).
Muddy Creek	0	9	234%	4	None (5 acre surplus)	To date only 192 acres salt control. 6,050 acres salt control at full project implementation, which would require a total of 121 acres of WHR (6,050 x 0.02 = 121). A lack of pressurized irrigation water supply is contributing to low demand for sprinkler systems. The Muddy Creek Canal, which delivers municipal and irrigation water to the community of Emery, UT, has yet to be piped.

Table 5 - Summary of Wildlife Habitat Replacement in Wyoming Salinity Control Units for FY 2016

WYOMING						
Salinity Control Units	Habitat acres acquired in 2016	Habitat acres replaced, cumulative total	% concurrent (i.e., % of current WHR obligation accomplished)	Habitat acres to be concurrent by end of 2016	Remaining acres needed to be concurrent	Comments
Big Sandy	0	860 (860 acres total in EIS)	> 100%		None (replacement considered complete, but see comments)	EIS analyzed treatment of 15,700 acres with improved irrigation systems. As of March 2014, 13,077 acres treated for salt control. Habitat/wetland replacement goal exceeded by approx.10 acres, and was considered complete in 2005. Due to wetland drying in 2014-2016, additional wetland habitat may be needed to meet replacement goal before project can be closed-out.
Henry's Fork	15 acres 357 acres planned (estimate) (2 projects)	193	?	28.3?	?	Loss and replacement of wetland habitat values associated with irrigation improvement projects is estimated using Montana DOT wetland assessment tool. The 2013 EIS states that 2000 functional points are expected to be lost over the life of the project, although only 46% of the 2000 wetland acres would be impacted (=800 acres). A new model developed by NRCS and USFWS is being used to assess instream habitat replacement values for alternative replacement projects such as fish barrier construction, riparian fencing, and fish passage construction. The habitat acres needed to be concurrent needs to be confirmed by NRCS.

U.S. Geological Survey (USGS)
Colorado River Basin Salinity Control Program
Accomplishments for Fiscal Year 2017

The USGS conducts a variety of science activities to assess salinity conditions in the Colorado River, guide program management decisions, and to determine the effect of salinity control efforts. These activities are conducted in cooperation with the Colorado River Basin Salinity Control Forum and in support of Federal resource management agencies including the Bureau of Land Management (BLM), Bureau of Reclamation (Reclamation), and the Natural Resources Conservation Service (NRCS). In addition, activities and accomplishments in USGS National programs such as the Groundwater and Streamflow Information Program (GSIP) and the National Water-Quality Assessment (NAWQA) Program provide valuable information to Salinity Control Program (SCP) agencies. These SCP science-support activities and relevant USGS National program activities (described below) range from data collection in a basin-wide monitoring network, to research on the fate and transport of salt at various scales.

Colorado River Basin Monitoring Network and Basic-Data Collection:
Colorado River Basin 20-Station Monitoring Network

Figure 1 - USGS gage–Green River near Greendale, UT.

The USGS currently operates a network of 20 streamflow gaging stations for Reclamation for purposes of tracking and modeling current and future estimates of salinity concentrations and loads in the Colorado River Basin (CRB) (figs. 1 and 2). Streamflow and specific-conductance data from this network are used by the USGS to model salinity concentrations and loads (SLOAD output) for use by Reclamation in the Colorado River Simulation System (CRSS) water-supply and salinity projection models. Reclamation depends on the CRSS for midterm and long-term supply and water-quality studies in the CRB. During midterm studies, water-quality results are substantially impacted by initial model conditions, which include salinity concentrations downstream of major reservoirs such as Lakes Powell and Mead.

Colorado River Basin BLM Salinity Risk Assessment and Mapping

The objective of this work is to identify saline soils in the upper Colorado River Basin (CRB) at high risk of erosion. The approach includes the use of digital soil mapping (DSM) strategies and soil erosion modelling applied within geographic information systems. Recent research has shown increasing success using the DSM strategy in mapping regional to global scale soil maps (including areas previously unmapped) from archived soil survey field observations (Hengl et al., 2017; Nauman and Duniway 2016) and from original soil survey maps (Chaney et al. 2016). These efforts all utilize extensive environmental raster datasets (e.g. Landsat imagery, digital elevation models) to extend the inference of the soil observations available. The state of Utah has 9,368 field soil observations of varying detail available that can be leveraged in different ways to help map salinity using a DSM framework. The location of saline soils relative to drainages, as well as the local conditions that control erosion risk, are important factors to consider when designing salinity control management actions. Primary erosion risk factors include soil texture, slope steepness and length, and proportion of the soil surface exposed (not protected by rocks, lichens, litter, plants, and other protective armoring).

Figure 2 - . Location of monitoring sites in the 20-station network.

We have created a new soil electrical conductivity (EC) 30-meter resolution map (Fig. 3) using a suite of raster environmental mapping layers (terrain, landform, landscape position, and geologic indices, see Nauman and Duniway 2016) for BLM. This new EC map will be integrated with a spatially explicit erosion model (USPED; Mitasova et al. 1996, Warren et al. 2005, Rodriguez and Suarez 2012, Aiello et al. 2015). This erosion model builds on the revised universal soil loss equation to use stream power sediment transport concepts to better model erosion and deposition in complex topographies. We have also created new versions of the required attribute layers for - soil erodabilityrainfall-runoff; and cover - based on existing data and remote sensing. Final products will include salinity risk maps, created by overlay erosion predictions and the new soil EC map to identify areas with saline soils that are in moderate to high risk of erosion. USGS contacts: Michael C. Duniway, Travis Nauman, and Christopher Ely, US Geological Survey – Southwest Biological Science Center

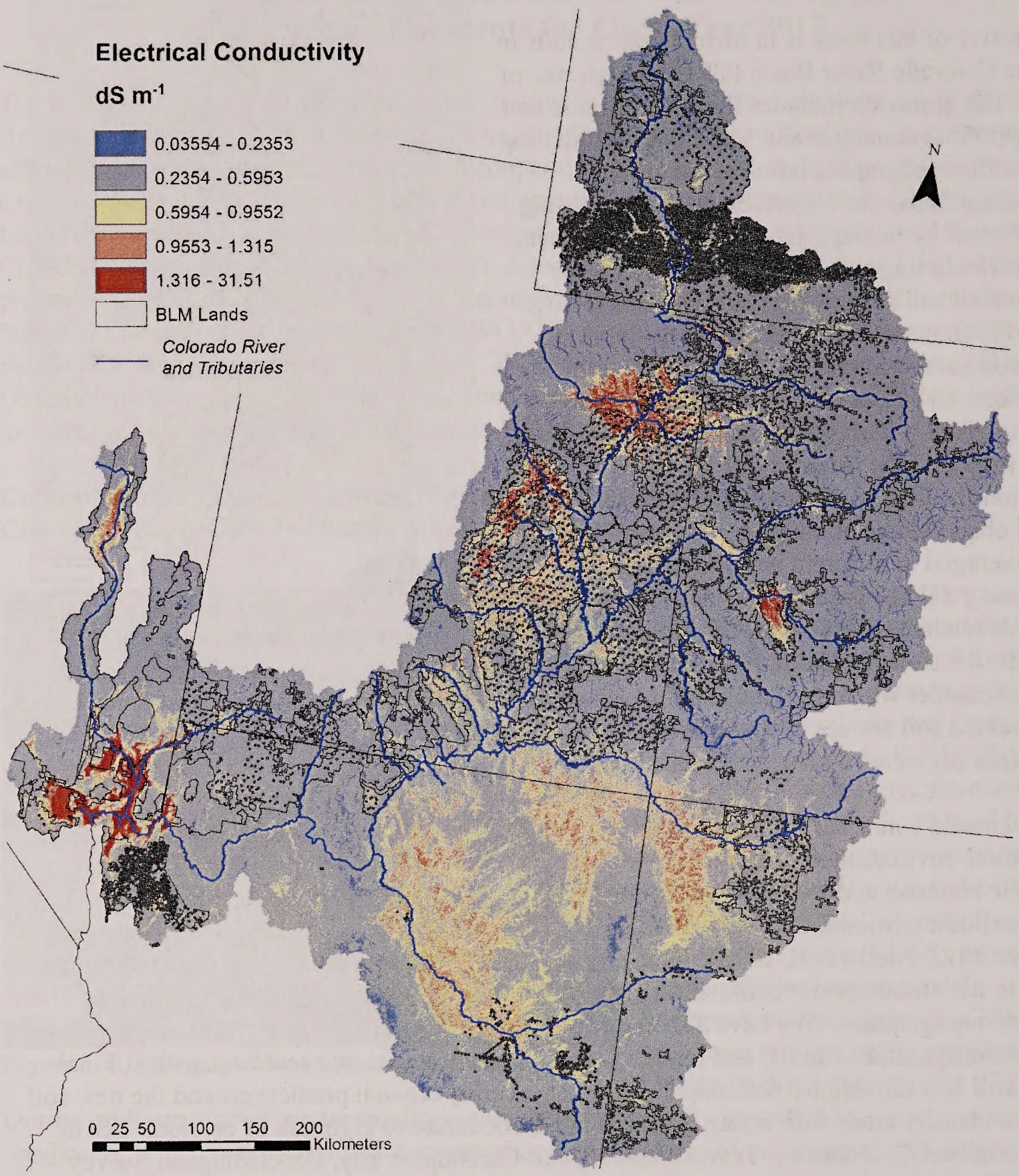

Figure 3 - New surface soil EC map in dS m-1 for Upper CO watershed (RMSE = 1.82)

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Hydrogeologic Characterization of Paradox Valley and Evaluation of Alternatives for Salinity Reduction in the Paradox Valley Unit, Montrose County, Colorado

Figure 4 - Paradox Valley

Paradox Valley in western Colorado is a collapsed salt anticline (fig. 4), where groundwater flow has led to the dissolution of salt deposits and the development of a highly concentrated groundwater plume of brine in the central part of the valley. The Dolores River, a tributary to the Colorado River, flows across the axis of Paradox Valley and functions as a groundwater discharge location. Here, the Dolores River experiences substantial increases in salinity as it intercepts the brine, with historical (1988-1995) salt loads estimated to range from about 95,000 to 205,000 tons per year. Under the Colorado River Basin Salinity Control Act, Reclamation constructed and operates a salinity control project, the Paradox Valley Unit (PVU), to reduce salinity loads to the Dolores River. The project consists of a series of shallow pumping wells designed to intercept the brine before it flows into the river and an injection well that disposes of the produced water in deeper geologic formations. The injection well system is nearing the end of its useful life, and Reclamation is exploring alternative strategies to reduce the salinity loads to the Dolores River. Possible future mitigation alternatives to be assessed include: (1) reducing recharge on the valley floor through modification of surface-water impoundments and (or) watercourses, and changing irrigation practices, and (2) managing (increasing) the stage of the Dolores River in the valley to decrease the groundwater gradient and flow between the aquifer and the river. The USGS is assisting Reclamation in these efforts through the development of conceptual and numerical groundwater flow and transport models and supporting hydrogeologic characterization.

Groundwater-Flow Modeling and Evaluation of Water-Management Scenarios for Salinity Reduction

The USGS has developed conceptual and numerical models of the Paradox Valley groundwater-flow system to aid in understanding brine movement in the valley and for evaluating the effects of potential water-management scenarios on brine discharge to the Dolores River. A conceptual model of groundwater hydrology and water quality in the Paradox Valley was developed that provides an improved understanding of the hydrogeologic framework, the spatial and temporal distributions of recharge, groundwater-flow directions, salt dissolution, and stream-aquifer interactions. A numerical groundwater-flow and transport model was developed beginning in 2011, which quantifies the water and chemical budgets for the Paradox Valley including the PVU. The numerical model provides a tool for quantitatively assessing groundwater flow and brine movement toward the Dolores River and for evaluating the effect of potential water-management scenarios on brine discharge. In 2013, the USGS conducted a 3- month aquifer test, utilizing existing PVU brine-production wells and nearby monitoring wells, to increase the amount of quantitative data to support modeling. In 2015, the numerical model was updated to include results for the freshwater-brine interface from the AEM survey, and simulations of water-management scenarios were initiated.

Preliminary results of calibration of the three-dimensional numerical model indicated that temporal variations in brine discharge to the Dolores River primarily are related to variations in infiltration of water (irrigation return flow and conveyance losses) in the western part of the valley, and to seasonal variations in stage of the Dolores River. These results suggest that water-management operations that increase freshwater heads in the alluvial aquifer could suppress the freshwater-brine interface and reduce brine discharge to the river. The processes and parameters that control these responses, however, are complex. The USGS is currently using the model to evaluate the effects of managing (increasing) the stage of the Dolores River in the valley to decrease the groundwater gradient, flow between the aquifer and the river, and thus brine discharge. Scenarios that increase or decrease recharge on the valley floor through manipulation of irrigation practices or modifications of surface-water impoundments also are being explored.

In 2016 and 2017, calibration of the three-dimensional groundwater-flow and transport model was reevaluated using additional data on brine injection provided by Reclamation. The modeled area was reduced to focus on the Paradox Valley alluvial aquifer and the PVU pumping wells. The revised model provides an improved representation of the PVU brine pumping and the resulting salinity loads in the Dolores River. In addition, high-precision GPS surveys of PVU pumping wells and Dolores River streamgages was completed in September 2017 that will provide absolute elevation information needed for final model calibration. A report presenting the conceptual and numerical models underwent revisions in 2016 and 2017, and publication of the modeling report is expected during the spring of 2018.

Estimates of Salinity Loads for the Dolores River in Paradox Valley, Western Colorado

Reclamation evaluates the effectiveness of the PVU based on differences between the TDS loads computed at two USGS gaging stations on the Dolores River. Dolores River at Bedrock (USGS station 09169500) is located where the river enters the valley (upstream from the PVU), and the

Dolores River near Bedrock (USGS station 09171100) is located where the river exits the valley (downstream from the PVU) (fig. 4). Loads are based on continuous measurements (15-minute interval) of specific conductance and discharge at the two gages and monthly water-quality samples, which are used to develop regressions between TDS and specific conductance. The USGS periodically assists Reclamation with updating the regressions and salt load estimates as new data become available. The two most recent USGS publications were authored by Chafin (2003), who developed regression models and computed daily salt loads for January 1988 through September 2001, and Linard and Schaffrath (2014), who developed regression models for October 2009 through September 2012.

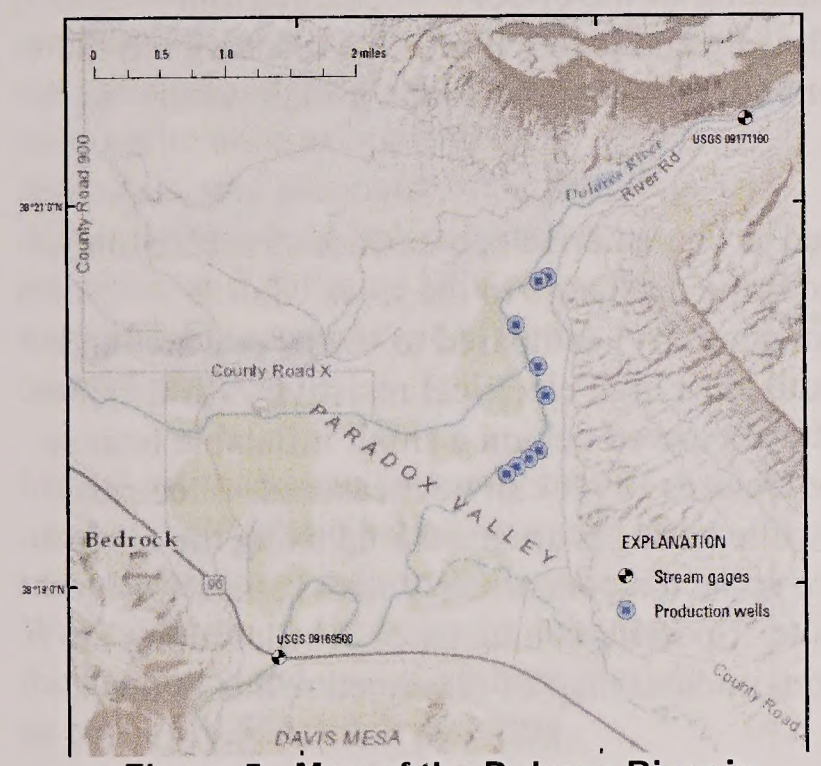

Figure 5 - Map of the Dolores River in Paradox Valley showing locations of streamgages and production wells.

In 2016, the USGS began a new project to develop new regression models that relate TDS concentrations to specific conductance for the period of record from 1980 to 2015 for the two Dolores River sites that bracket the PVU in the Paradox Valley. The results will be used to update the regressions equations reported on the USGS NRTWQ website (*http://nrtwq.usgs.gov/*), which were originally published by Linard and Schaffrath (2014). The updated regressions are complete, the results are being applied to continuous records of specific conductance and discharge to estimate the gain in salt load to the river as it flows across the Paradox Valley for water years 1980 through 2015. A report documenting the regression analysis and loading calculations was published in 2017 (Mast, 2017) and update was provided to the Forum.

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Use of Continuous Resistivity Profiling to Characterize Brine Discharge Zones along the Dolores River, Paradox Valley, Colorado

Although operation of the PVU in the Paradox Valley has reduced salt loads in the Dolores River by about 80,000 tons per year, upwards of 40,000 tons per year of excess salt is still exiting the valley indicating additional sources of brine to the river that are not captured by the current well field. In 2017, the USGS began river- and ground-based geophysical surveys better define the spatial extent and temporal variability of brine-discharge zones along the river. This information is needed by Reclamation to aid in the selection of optimal locations for new brine-collection wells. A secondary objective is to improve understanding of the effect of recharge from managed ponds and wetlands west of the river on the rate and location of brine discharge to the river. This information is needed to inform solutions for reducing salt load through water management alternatives in the Paradox Valley.

Continuous Resistivity Profiling (CRP) is being used to characterize sub-surface structure in the salt plume and delineate potential areas of enhanced brine discharge to the river. Saline groundwater has a low electrical resistivity (high conductivity) compared to the river water and the fresh water lens in the alluvial aquifer, which both have high electrical resistivity (low conductivity). The CRP method uses floating electrodes towed behind a small inflatable boat so that resistivity beneath the entire valley reach of the Delores River can be measured. Electrical current is injected and extracted at two electrodes, while voltages are measured using the other electrodes. Location (GPS) and bathymetry data are collected concurrently with resistivity measurements to georeference the geophysical results. Specific-conductance profiles along the river also are collected from the boat to provide a longitudinal map of dissolved solids in the river.

The CRP and conductance profiles were conducted over the 7-mile reach of the river between the USGS stream gages. The first CRP survey took place during early-spring baseflow conditions in March of 2017 when the ponds/wetlands are filled but before snowmelt began, and a second CRP survey took place during spring runoff high flow in May of 2017. A third CRP survey was conducted in September 2017 during fall baseflow conditions. In addition to the CRP surveys, ground-based electromagnetic surveys were conducted in March of 2017 to characterize the extent of brine in the alluvial aquifer adjacent to the river. Results from CRP will provide two-dimensional vertical cross sections of electrical resistivity along the boat tracks oriented parallel to the river. Results from ground-based geophysical methods will provide plan-view maps of electrical resistivity (and interpreted depth to the freshwater-brine interface) for the surveyed areas. Study results will be published as USGS data releases in 2018.

Statistical Modeling (SPARROW and LowGunS) Applied to Assessing the Distribution of Salinity Loads and Load Sources in Streams of the Upper Colorado River Basin

The USGS has developed two models to assess the distribution of salinity loads in surface waters and sources of those loads in the Upper Colorado River Basin (UCRB): (1) The UCRB SPARROW (Spatially Referenced Regressions on Watershed) attributes model and (2) The Lower Gunnison River Basin Water-Quality model (LowGunS). These models represent the surface-water flow system at basin and sub-basin scales and are based on conceptual models that relate observed loads in UCRB streams to up-basin physical characteristics including elevation, precipitation, geology, land cover, and land and water use. Both models estimate salinity load and load sources and can be used to improve SCP managers' and planners' understanding of the salinity-load balance and to prioritize and optimize SCP resources toward efficient and cost-effective control projects.

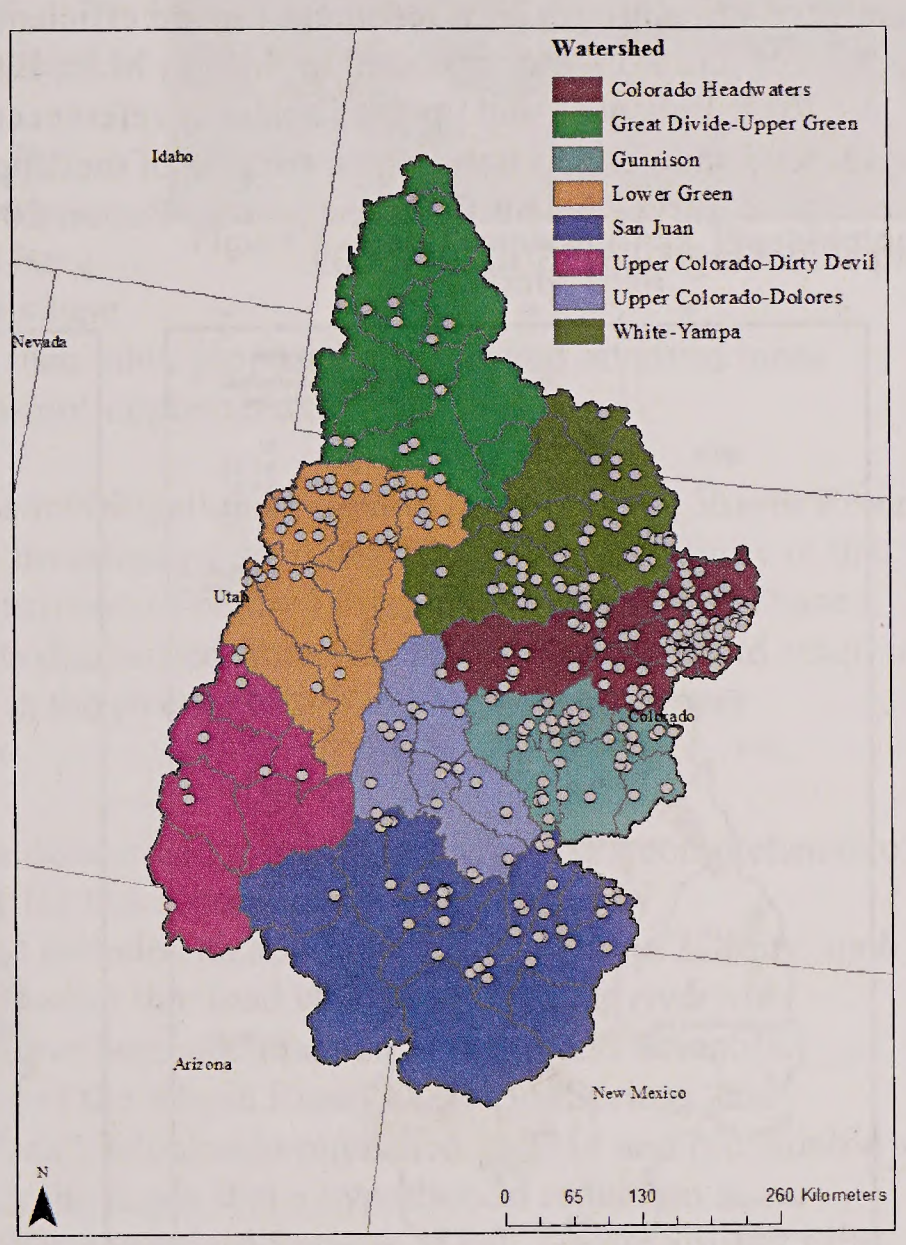


Figure 6 - Map of the Upper Colorado River Basin showing the location of major watersheds and 318 monitoring stations (grey points) where salinity loads were estimated and are being used as calibration data in SPARROW 2.0.

Model estimates are currently being used by SCP participating agencies to meet a variety of information needs. Work continues, however, to enhance the accuracy and utility of these models as part of SCP science planning.

Upper Colorado River Basin Salinity Modeling – Updated and Enhanced SPARROW Model (SPARROW 2.0)

The UCRB SPARROW model (UCRB SPARROW 1.0) was developed by the USGS in 2009 to provide improved understanding of the spatial distribution of salinity sources, load accumulations, and transport mechanisms in the UCRB. This model relates observed salinity loads in UCRB streams to up-basin physical characteristics including elevation, precipitation, geology, land cover, and land and water use, and routes those loads through the stream network to estimate loads in more than 10,000 unmonitored stream reaches.

In 2014 and 2015, the USGS began development of an updated UCRB model referred to as SPARROW 2.0. The updated model builds on the geospatial basin characteristic data sets and modeling approaches developed for the SPARROW 1.0 model with emphasis on

providing estimates of salinity load in the UCRB that reflect the current level of salinity control on irrigated lands under long-term streamflow conditions. Work to update the model included construction of the UCRB stream network, calibration to the aforementioned long-term mean annual salinity loads at 318 sites, and compilation of recent (2010) watershed characteristics data sets, including the updated irrigation dataset. The updated model is complete, and the report documenting the model and simulations was published in 2017. Model-estimated loads and load sources (e.g. natural vs. agricultural sources) allow managers to better understand and estimate load distribution and yield to streams in any area of interest, even if little or no data are available for that area. In turn, this information can be used to prioritize and optimize SCP resources toward efficient and cost-effective control projects. Results of this work are published in: Miller, M.P., Buto, S.G., Lambert, P.M., and Rumsey, C.A., 2017, Enhanced and updated spatially referenced statistical assessment of dissolved-solids load sources and transport in streams of the Upper Colorado River Basin: U.S. Geological Survey Scientific Investigations Report 2017–5009, 23 p., https://doi.org/10.3133/sir20175009.

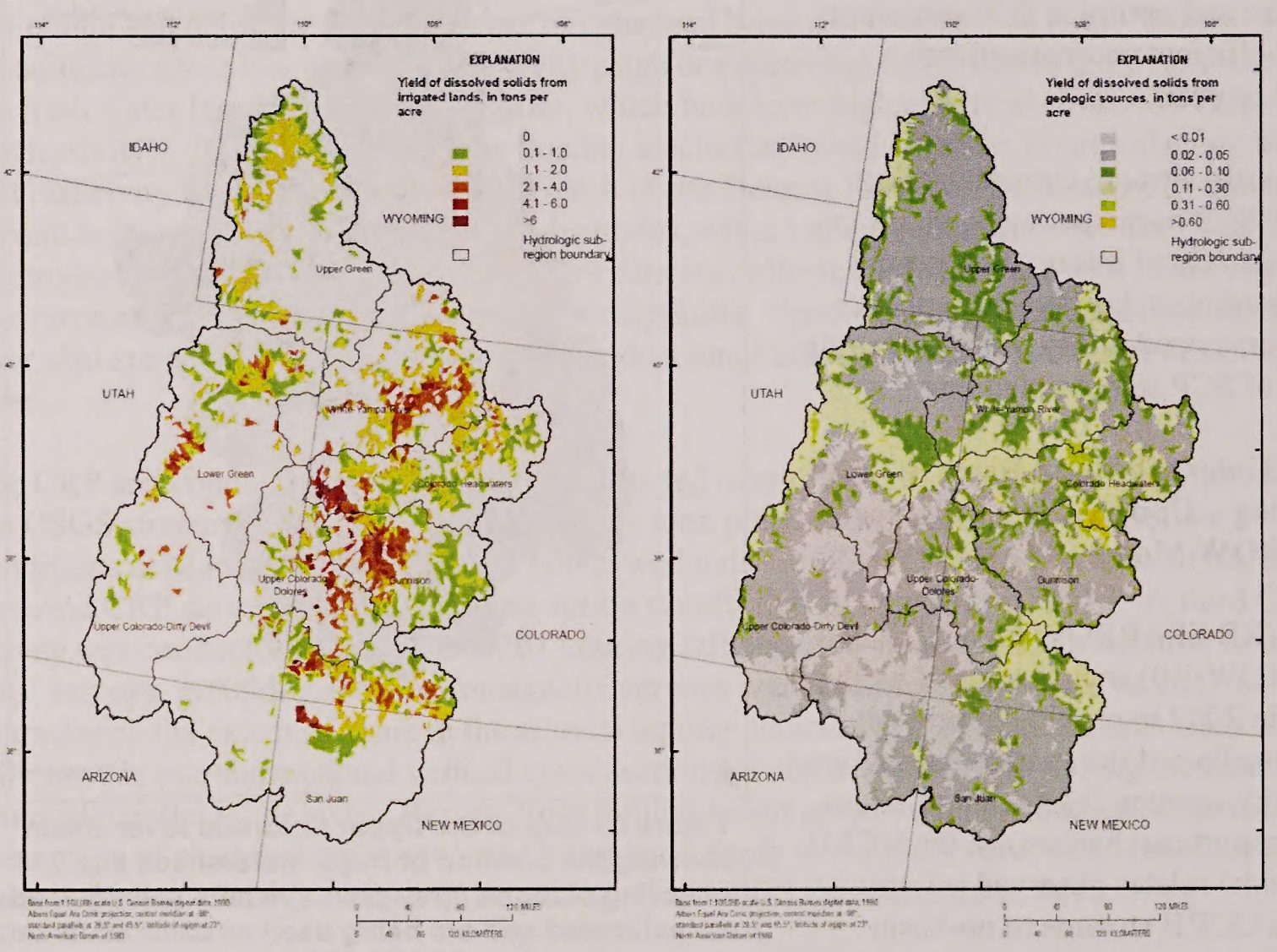


Figure 7 - Dissolved-solids yields from irrigated lands and from geologic sources, Upper Colorado River Basin from SPARROW 2.0 Model (Miller and others, 2017)

The USGS continues to work closely with Reclamation scientists and engineers to maximize the SPARROW model utility toward the enhancement of future Reclamation salinity transport models, including providing estimates and predictions of agricultural and natural salinity loading to the CRSS model.

Investigation of Transport of Dissolved Solids Discharged from Pah Tempe Springs, Southern Utah, and Possible Remediation of Salinity Load to the Virgin River

Pah Tempe Springs (also known as Dixie Hot Springs) (fig. 8) discharge substantial amounts of dissolved solids (salt) to the Virgin River, which are then transported downstream and contribute to the salinity of the Colorado River. Consequently, these salts affect the suitability of water in the Lower Colorado River Basin for agricultural, industrial, and domestic uses. Studies conducted in the 1970s and 80s determined that desalinization of the water discharged from Pah Tempe Springs is technically feasible. However, the reduction in dissolved solids that would have been realized in the Colorado River from this type of project was less economical, at the time, than other proposed projects and involved more uncertainties. Consequently, the project was not implemented.

Figure 8 - Pah Tempe Springs, Washington County, Utah

During 2007-08, USGS began a multi-phase investigation of salinity loading in the Virgin River and from Pah Tempe Hot Springs. Phase 1 investigated the transport and fate of salinity in the Virgin River from Pah Tempe Springs downstream to below Littlefield, Arizona. The Phase I investigation concluded that removal of salts discharged from Pah Tempe Springs could result in a larger reduction in dissolved-solids loads in the river at Littlefield, Arizona, than was previously estimated by Reclamation.

On the basis of these results, SCP managers determined to move forward with a comprehensive investigation (Phase II). The scope of work for this second phase was defined by recommendations resulting from Phase I and included an additional assessment of salinity load lost as seepage from the Virgin River and whether that load was returned to the river via Littlefield Springs. The results of Phase II have been documented in the USGS Scientific Investigations Report "Hydrosalinity studies of the Virgin River, Dixie Hot Springs, and Littlefield Springs, Utah, Arizona, and Nevada", which was published in 2014 and is available at *http://pubs.usgs.gov/sir/2014/5093/*. The results imply that a hypothetical reduction in dissolved-solids load in the Virgin River below Littlefield Springs, if Pah Tempe Springs salts were restricted, may be from about 67,500 or 71,500 tons/year immediately and as high as 90,000 tons/year within 30 years of restriction.

The USGS, in cooperation with SCP, Reclamation, and the Washington County Water Conservancy District (WCWCD), is currently completing two study tasks as part of a third study phase (Phase III), exploring the feasibility of Pah Tempe Springs load mitigation scenarios and the effects of mitigation on downstream Virgin River flow, chemistry, and ecology. Specifically, the current study phase is assessing the potential of approach to reducing the Pah Tempe Springs salinity load to the Virgin River. The study is investigating pumping thermal water from within the Hurricane Fault damage zone to lower the groundwater pressure head at spring discharge locations and reduce or eliminate discharge from the springs to the river. The USGS designed

experiments to assess the effects of groundwater withdrawals from the Hurricane Fault zone on discharge of saline water from Pah Tempe Springs, and on the flow and quality of water in the receiving Virgin River (figs. 9 and 10). Test results showed that pumping to capture thermal saline water is nearly 100 percent efficient with low flow in the Virgin River upstream of the study reach, and that unwanted freshwater capture can occur when the background river stage is higher. Drawdown and spring discharge reduction observed during pumping showed that the near-surface bedrock aquifer is extremely permeable. Groundwater temperature data indicate that the source of thermal water occurs several hundred feet upstream of the Hurricane Fault. The study report for Phase III is complete and is in USGS technical review.

A groundwater flow model of the fault damage zone has been constructed for use in assessing test results and for evaluating future diversion and treatment scenarios. The subsurface characteristics of the Hurricane Fault zone are unknown and is a limitation of the model. To learn more about geothermal flow in the fault zone, a fourth phase (Phase IV) was added to the investigation. This phase, which will be conducted in cooperation with the WCWCD in FY2017/2018, will involve drilling three test wells into and adjacent to the fault zone to investigate the hydraulic properties and geochemistry and fluid flow. These data will then be incorporated into the model. Test well drilling is being funded by the WCWCD and is projected to begin in the fall of 2017.

Study results aid in understanding the general hydraulic characteristics and properties of the fault zone and will allow for assessment of the feasibility and effectiveness of a range of possible pumping scenarios to reduce salinity load to the river. In particular, the groundwater flow model will aid in optimization of well placement and pumping schedules should a salt load mitigation project be developed. This will allow Reclamation and SCP managers to assess the scope and cost of Pah Tempe Springs salt load mitigation approaches that incorporate groundwater pump-and-treat techniques.

Rangeland Sources of Salinity – Evaluation of the Effects of Selected Rangeland Conditions on the Sources and Transport of Dissolved Solids Delivered to Streams in the Upper Colorado River Basin

The USGS, U.S. Department of Agriculture (USDA) Agricultural Research Service (ARS), Reclamation, and other member agencies of the Colorado Salinity Control Forum have been working together to further the understanding of dissolved-solids sources and transport processes in the UCRB since the 1970s. While many past studies have focused on irrigated agricultural lands, the overall objective of this study is to improve the understanding of sources and transport mechanisms in rangeland catchments that deliver dissolved solids to streams in the UCRB. An important goal is to gain knowledge about how certain land management practices or land conditions may be affecting dissolved-solids yields to streams, such that changes in these practices and conditions could be made to reduce dissolved-solids yields.

The study consists of six phases, including (1) a literature review on sources and transport of dissolved solids in rangelands (completed), (2) a synthesis of the literature review (completed), (3) a GIS reconnaissance of the effects of rangeland conditions on dissolved-solids yields (completed), (4) an evaluation of the potential to improve an existing dissolved-solids source and

transport model for the UCRB by better accounting for relevant factors in rangelands, including development of a SPARROW II (completed) and watershed scale model simulation of salinity loading at various scales (USGS report in review, BLM/ARS work ongoing), and (5) an analysis of the relation between dissolved solids and suspended sediment in streams in the UCRB (completed).

Relations between the health of rangelands (i.e. state within an Ecological Site) and transport potential of salts identified in this study may be used to investigate where conservation practices can be applied to cost-effectively reduce dissolved-solids yields to UCRB streams.

As part of the investigation of salinity sources from natural landscapes, the USGS is testing a model for simulating salinity mobilization and transport at a watershed scale using the same models that the USDA ARS and BLM are going to be using across the UCRB. The second study is examining how stream chemistry can be used to assess the source of salinity from a natural landscape.

Modeling Rangeland Dissolved-Solids Sources in Muddy Creek and Molen Seep Wash, Utah

The SCP has been working to further understand dissolved-solids sources and the associated transport processes in rangelands in the UCRB. Rangeland management has operated under the presumption that changes in land cover result in changes in watershed conditions and load response. However, these correlations are masked by transient fluctuations in precipitation, surface runoff, or irrigation practices. The overall objective of this study is to develop a conceptual model to assess scaling-up hydrologic parameters estimated from rainfall plot-scale experiments to the watershed scale. In addition, the conceptual model will be used to assess how different scenarios of land use and climate might affect dissolved-solids loads.

The plot-scale rainfall-runoff experiments were completed by the USDA ARS at the Molen Seep (Dry X) study area. An APEX model incorporating salinity is being developed for parts of the Muddy Creek and Molen Seep (HUC12) watersheds. Land use, soil distribution, and topographic characteristics are used to construct the model domain. In addition, long-term meteorological parameters (air temperature, precipitation, wind, solar radiation, and relative humidity) from 11 stations in and around the watersheds are used (fig. 11). Four USGS streamflow gages in the watersheds were used for salinity load calculations. At the Upper Muddy Creek, the Lower Muddy Creek, the Molen Seep Wash, and the Molen Seep tributary streamgages, continuous stage, discharge, and specific conductance were monitored with periodic analyses of event water quality.

Figure 9 - Study watersheds showing the modeled sub-catchments, meteorological stations, and streamgages. The photograph is of USGS streamgage 385202111121601, Muddy Creek below Miller Canyon near Emery, UT

The watershed model has been constructed and the weather, land use, and soil databases have been populated. The model was used to simulate the distributed discharge and dissolved-solids loads at locations throughout the model domain as well as the four stream gages. Simulated model loads are compared to observed discharge and dissolved-solids loads for overall consistency.

The model was used to conceptually investigate various scenarios of land use and vegetation changes on dissolved-solids loading in the watersheds. The precipitation volume, event length, and temporal distribution of events also were varied to better understand the effects on dissolved-solids loading to the streams. A draft report describing the model and simulations is ready for review with publication expected in FY2018. Results indicate that simulation of distributed precipitation hourly is critical for simulating transient storm loads that are common from arid lands in the UCRB. The model scenarios can be used to assess where conservation practices can potentially be applied to cost-effectively reduce dissolved-solids yields to UCRB streams.

Use of Stream Chemistry as an Integrator of Watershed and Landscape Processes to Assess Salinity Sources and Loads and their Relation to Natural Landscapes

The SCP is conducting studies to develop modeling tools to estimate salinity loading and to assess approaches to synthesizing and scaling-up rain-simulation plot-scale experiment results to develop conceptual and numerical sub-watershed scale models of salinity transport in selected areas in the UCRB. Additionally, there is a need for data from streams to connect source material to the stream salinity loading that is actually occurring. A more detailed understanding of the geochemical fingerprints of waters received by streams draining natural landscapes allows us to trace those waters to their sources and to constrain and refine future conceptual or simulation assessment models, as well as assess the accuracy and utility of their projections of the effects of management practices at various scales. Streams integrate the effects of all the hydrologic flow paths, processes, and surface activities in a watershed. As a result, stream chemistry will also reflect this integrated signal and has been used to forensically investigate sources, transport, and the fate of chemical constituents including salinity.

This study is using integrated stream chemistry to assess sources of salinity from natural landscapes and provide the data required to assess transport mechanisms in future modeling and land-management decision support tools. Synoptic sample sets have been collected in 2016 on Muddy Creek and the San Rafael River in central Utah (figs. 11 and 12) from the headwaters to their confluence with the Dirty Devil and Green Rivers under low flow conditions. These sample sets represent the sources and chemistry of baseflow loads. Additional samples were collected during runoff events that represent the surface component of loading in September of 2016.

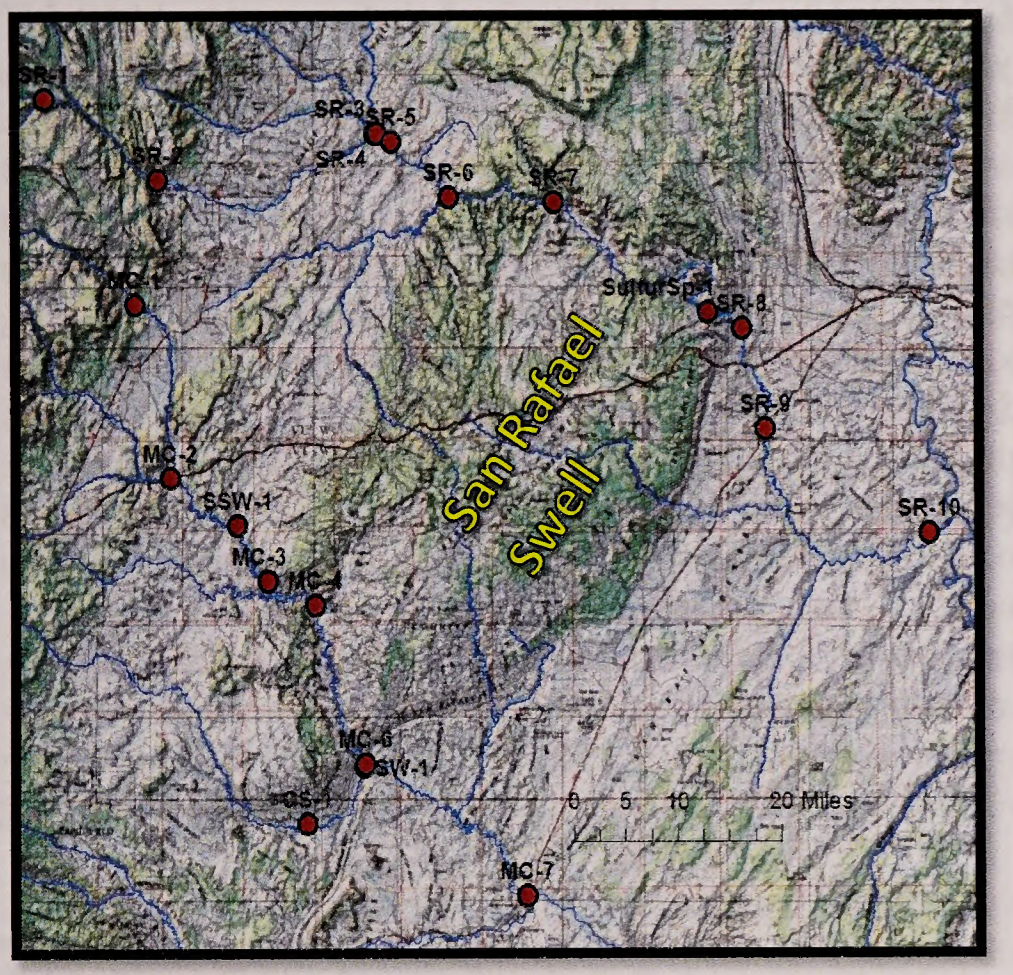


Figure 10 - Synoptic sampling sites on Muddy Creek and the San Rafael River

Results from the baseflow sample sets indicate that there are distinct chemical signatures to the salinity loading from the Mancos Shale and the Carmel Formation, a Jurassic-age interbedded gypsiferous sandstone/limestone/siltstone. Storm flow samples have geochemical signatures of multiple formations and the source of solutes evolve over a storm event. For example, the source of solutes in Muddy Creek in baseflow conditions is the San Rafael Group while the San Rafael River solutes are predominantly from the Mancos Shale. Samples collected over a storm event on the San Rafael River indicate much of the storm solute load is derived from the San Rafael Group while Mancos provides the baseflow load. The implications for of these results for salinity control are that multiple sources of load that are active at different times which needs to be considered in the design of control projects.

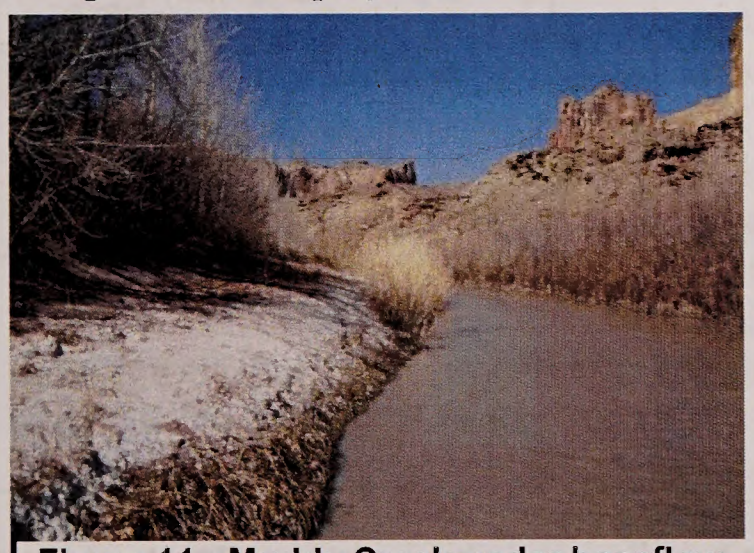
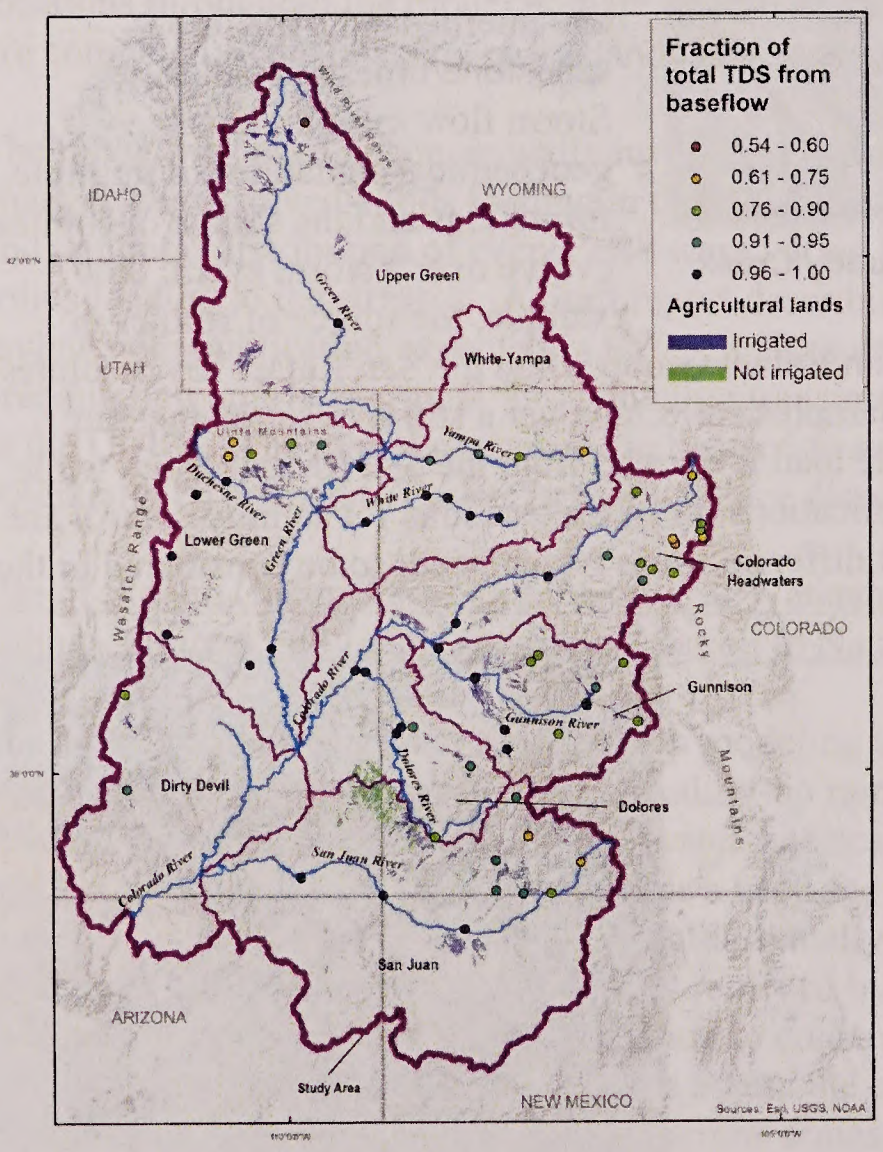


Figure 11 - Muddy Creek under baseflow conditions with effervescence salts on the stream bank

Figure 12 - Water sample collection along the San Rafael River

Analysis of Baseflow Salinity Loads and Trends in Loads

Across the UCRB, baseflow on average accounts for about 50 percent of the annual streamflow yet because of high salinity concentrations in baseflow it accounts for a larger percentage of the salinity load. This study begun in 2017 assesses the baseflow component of load and trends in that load in the UCRB building on USGS funded work on determining baseflow component of streamflow in the UCRB. Chemical hydrograph separation was used to estimate baseflow discharge and baseflow dissolved solids loads at 69 stream gages across the UCRB. On average, it is estimated that 89 percent of dissolved solids loads originate from the baseflow fraction of streamflow. We believe that this is methods overestimates baseflow loads because it lumps summer and fall storm loads in to the baseflow load fraction. Further analysis at selected site indicates that between 5-15 percent of the baseflow loads is contributed by storm flow. Statistical trend analysis using weighted regressions on time, discharge, and season was used to evaluate changes in baseflow dissolved solids loads at 29 sites from 1987 to 2011. Sixty-two percent of sites showed statistically significant decreasing trends in baseflow dissolved solids loads. At the two most downstream sites, Green River at Green River, UT and Colorado River at Cisco, UT, baseflow dissolved solids loads decreased by a combined 780,000 metric tons, which is approximately 60 percent of estimated basin-scale decreases in total dissolved solids loads as a result of salinity control efforts. The study report has been submitted to a journal and is being revised addressing peer review comments and expected publication FY2108.



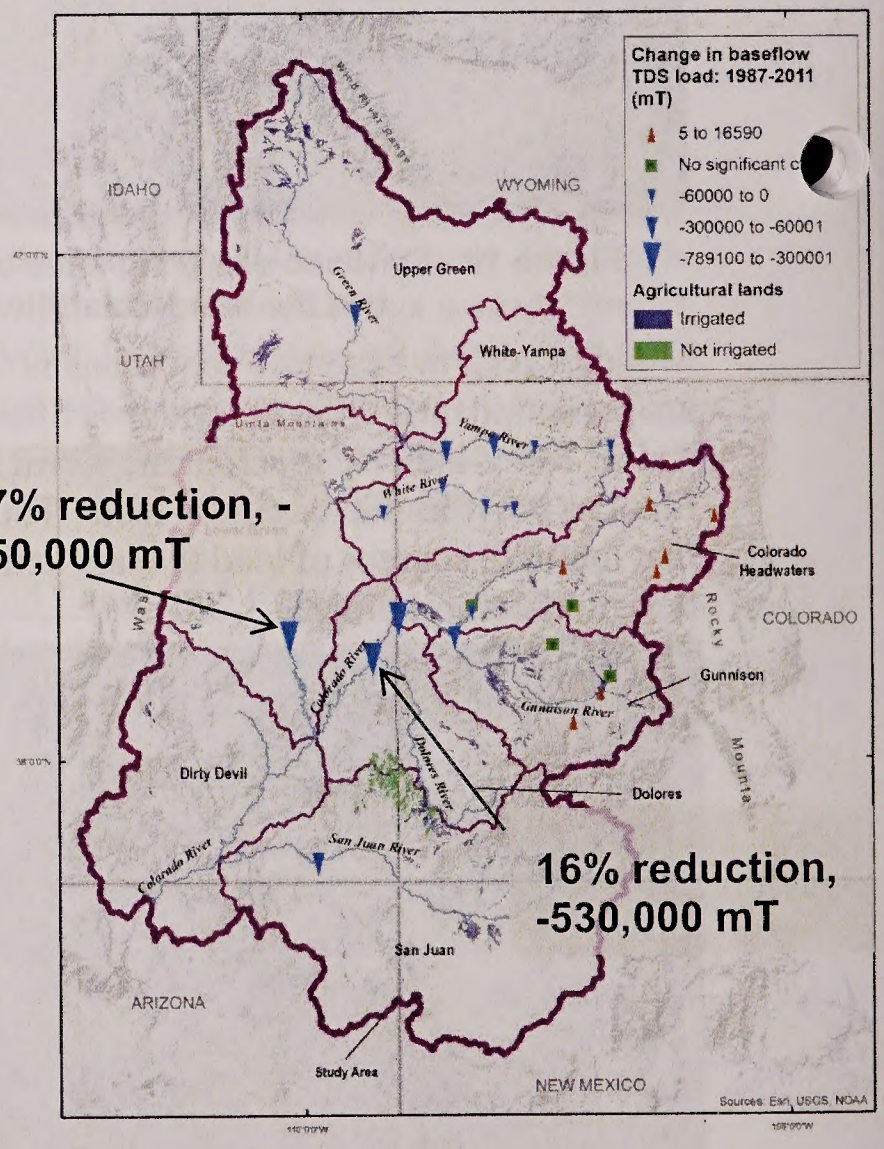


Figure 13 - Fraction of total dissolved solids load in baseflow and change in baseflow load from 1987 to 2011

Bureau of Land Management (BLM)
Colorado River Basin Salinity Control Program
Accomplishments for Fiscal Year 2017

The BLM administers about 53 million acres of public lands in the Colorado River Basin (CRB) above Yuma, Arizona. Substantial portions of these public lands are ecologically classified as arid or semiarid rangelands. Point sources of salt on public lands include saline springs, seeps from marine sedimentary formations, abandoned flowing wells, discharge from abandoned mines, and discharge of waters from authorized activities such as oil and gas production or mining. Nonpoint sources of salt include surface runoff, soil erosion, stream sediments, and groundwater discharge to streams. Salts can be transported in solution or with solids such as soils or coarse fragments. Past studies have indicated that salt loading in rangelands is closely associated with sediment loading and that wind transport is the dominant mechanism of sediment movement across semi-arid and arid rangelands. Salt concentrations on public lands tend to be highest in areas underlain by marine sedimentary rocks such as shales and mudstones that receive less than 8 inches of annual precipitation.

Although salt concentrations can be very high in runoff from these lands, the frequency and volume of runoff is low because of the low precipitation and ephemeral nature of stream systems. Runoff from areas with highly saline soils in the upper basin is estimated to contribute about one-third of the annual salt load from BLM public lands.

The greatest volume of salt contributed from BLM-administered lands, however, is sourced from areas with moderate to low salt concentrations in soils that are relatively well-covered with perennial vegetation and receive more than 12 inches of annual precipitation. Although salt concentrations in runoff from these lands are low, total loading is relatively large because of higher water yields. These areas comprise about 67 percent of BLM-administered lands in the upper basin. Runoff from these areas is estimated to contribute more than half of the annual salt load from BLM-administered lands in the upper basin.

The BLM attempts to reduce these impacts to help maintain land-health standards by utilizing best-management practices; including terms, conditions, and stipulations in land-use authorizations; and requiring actions to restore lands upon completion of authorized activities. BLM also engages in many activities to restore degraded ecosystems that contribute excessive sediment and salts to CRB watersheds. These activities include constructing and maintaining grade-control structures, spreader dikes, and retention structures; emergency stabilization and rehabilitation efforts following wildfires; removal of invasive plant species, channel stabilization, and other riparian enhancements; maintaining road culverts; remediation of abandoned mine lands, and fire fuels reduction treatments. Salinity reductions for many of these activities continue to be difficult to quantify and report to the Forum because of factors such as the lack of adequate understanding about mobilization and transport of salts from rangelands and inability to conduct effectiveness monitoring for all projects. Reports from BLM State Offices (see below) reference many of these activities and the BLM is engaged in efforts with partner agencies to improve future ability to quantify salinity reductions from these efforts. To address these challenges, the

BLM is co-developing a system of tools/models: RHEM-APEX-AGWA ((Rangeland Hydrology and Erosion Model; Al-Hamdan et al., 2011); (Agricultural Policy EXtender model; Sharpley and Williams, 1990); (Automated Geospatial Watershed Assessment Tool; Hernandez et al, 2000)). The integration and linking of these tools/models was completed during FY2015. The collection of physical data to model parameter value justification is still being conducted on BLM CRB rangelands as previously funded by the Basin States Program and continued by the BLM.

Program Summary and Administration

The 2017 budget included a total allocation of $1,500,000 for Colorado River Basin Salinity Control projects funded through the Soil, Water & Air Management Program. Salinity Coordinator (SC) position was filled in January, 2013 and is placed administratively at the National Operation Center (NOC). Water resource specialist and soil, water, air program lead positions were filled at the Washington Office in fall of 2016. State soil, water, air program leads assist BLM field offices with support for salinity control projects and reporting.

Basin Wide Activities

Included in the funded projects is the BLM contracted work with USDA-ARS for multiple rainfall sediment and salinity transport projects. Data are being collected from Utah, Colorado, and New Mexico and will continue to be collected through 2018. This work continues from the previous BLM funded work to collect physical data to validate the tool(s) co-developed during FY2015. This tool can eventually be utilized for quantifying several BLM program's sediment and salinity contributions within the CRB and for prioritization of funding and future projects.

With the hiring of the Salinity Coordinator in January, 2013, BLM invested $100,000 in a joint USDA ARS-USDOI BLM project to conduct a study to improve the current understanding and identify the gaps in knowledge regarding the sources and transport mechanisms in rangeland catchments that deliver TDS to streams. A literature review ensued that is discussed in detail in the USDA-ARS section. The BLM, Reclamation, and NRCS management practices were included in the search for their relationship to salinity reduction. Multiple products have resulted including a dynamic bibliography which continues to be active presently. New salinity literature is added as it is released in from many sources and citations can be viewed online.

STATE REPORTS

For FY2017, $1.5 million was allocated for BLM's salinity-control program from its SWA subactivity to support projects that met the criteria the WO determined to be eligible for salinity control program objectives in the Upper Basin State Offices. Project funding is allocated toward proposals submitted by State Offices (AZ, CA, CO, NM, UT, WY) through the BLM Budget Planning System (BPSS) and prioritized for the WO SWA Program Lead with a well thought out and planned spreadsheet of all proposals provided by the SC. The SC has a sharepoint site that contains the criteria that has to be met at minimum for a project to be considered for Salinity funding. Project funding is allocated toward proposals submitted by State Offices through the BLM Budget Planning System.

General Program Summary and Administration
The BLM allocated $1,500,000 in FY2017 from its Soil/Water/Air (SWA) subactivity to support projects specifically relating to salinity control program objectives in its Upper Basin State Offices. Projects funded in FY2017 are described below in the State Reports section.

Overall Summary FY2017:
As previously indicated, the BLM is not able to report reductions accomplished through many of these efforts to the Forum because of technical and programmatic issues, but is working to develop approaches needed to quantify reductions. However, included in the $1.5 million funded projects is the BLM contracted work with USDA ARS for multiple rainfall sediment and salinity transport projects (final report to be ready summer, 2018). Data are being collected from New Mexico through October, 2017. This data collected becomes the physical data that the RHEM-APEX model will use for simulations from small to large scale rangeland questions, as a policy tool, and for evaluating better procedures. The APEX tool will be used to detect sediment deposition and erosion in wind, water, and terrestrially through a less expensive method to answer the public's questions regarding salinity.

Upon review of previously funded projects, the guidance needed for what needs to be sampled and required in a laboratory analysis can become available to assist the field offices for salinity-related processes. In 2012, 2,522 estimated cumulative tons of salt retained per year within the CRB were reported in the FAR using a particular equation since 2006. Since 2014, we are using the following physical equation to calculate tons of salt per year per area:

Assumptions throughout calculations in the BLM section include: % salt = 3% by weight; Average bulk density of soils = 1.65 g cm^{-3} unless stated otherwise and the principal tons of salt retained per year equation is as follows:

[x miles * 2 cu yd $mile^{-1}$ * 4467 lb yd^{-3} * 0.03 lb salt lb $soil^{-1}$] =
[13,401 lb salt lb * x miles $mile^{-1}$]= [6.7 tons of salt $year^{-1}$ * x mile $mile^{-1}$] eqn. 1

Fuels Treatment Effectiveness Monitoring Program
Since 2003, BLM has accomplished millions of acres of fuels management treatments including prescribed fire, seeding, thinning, mastication, and lop and scatter. Vegetation left on the ground from treatments such as lop and scatter, inhibits the transport of sediment and salts. Initially there may be increased erosion; however, overall per acre burned there is 1 cubic yard of sediment retained. Central to the success of the program is assessing the efficacy of those treatments. The BLM's Fuels Treatment Effectiveness Monitoring Program focuses on areas that are likely to intersect with wildfires leading to the destruction of vegetation and leaving paths for sediment and salinity surficial movement. Utilizing the Fuels Treatment Effectiveness Monitoring database (FTEM), field offices will complete a fuels treatment effectiveness assessment and input appropriate information into FTEM for all wildfires which start in, burn into, or burn through any portion of a fuel treatment area that has been completed. For example, since 2010, the Utah BLM Fuels Treatment Program has impacted sediment transport on over 260,000 acres resulting in more than 18,000 cu yd of sediment retained on BLM land with about half of it within the CRB Utah boundaries (8,900 cu yd of sediment retained = **2,450 tons retained approximately**).

Emergency Stabilization and Rehabilitation Program (ES&R)
ES&R is another BLM program that impacts sediment and salinity transport. Ten wildfires that have burned more than 10,000 acres, as addressed by the BLM, were identified for our modelling purposes. These fires included: the Rattle Fire Complex, the State Fire, the Lakeside Fire, the Dallas Canyon Fire, the Patch Springs Fire, the Faust Fire, the Grease Fire, the Clay Springs Fire, the Woods Hollow Fire, the Wolf Den Fire and the Baboon Fire. An example of what is being accomplished to gain the sediment retained on BLM land is the Rattle Fire Complex that burned a total of 94,519 acres of which 50,000 acres was on BLM land. The ES&R report provides sufficient detail of the area and treatment as well as the related costs. That information is combined with existing vegetation, land use, soil, slope and climate data to compare pre-burn conditions to post-burn and post-rehabilitation conditions. Once approved by the BLM ES&R Program, the results will be added to sediment retained on BLM lands total.

Recreation-OHV (Off Highway Vehicle) Program
Within the entire CRB, we have calculated that the Recreation-OHV Program contains 89,700 miles of dirt roads that contribute to sediment transport (Figure 14.) Based on a pound of soil having an average of 3 percent salt and that an average of 2 cubic yards are retained per mile of road maintained; it is assumed that at least one time since a BLM OHV road was maintained since it was built. This it reasons that a minimum of **20,560 tons of sediment** with at least 3 percent salt have been retained on BLM land due to road maintenance on OHV dirt roads.

Figure 14 - BLM Recreation-OHV Program dirt roads that contribute to sediment transport within the CRB

While the monitoring data from other programs continue to be updated, their numbers will be updated separately in the Salinity FAR. **The total number of salt tons retained by FY17 funded Salinity Program accomplishments are 88,733**. The calculated contributions from Recreation-OHV for Roads for overall miles (**20,560 tons** sediment); FTEM [(approximately **2450** (UT)] 1for FY17; and the ES&R Program for 11 BLM fires in CO and UT greater than 10,000 acres are being modelled for total sediment retained and FTEM numbers are currently being collected for other states for their contributions toward sediment reduction on BLM land within the CRB (numbers yet to be verified by WO staff). **The cumulative total for FY17** including OHV and FTEM (UT only) is ***111,743 tons of salt retained on BLM lands***.

Table 6 - BLM State Salinity Reports

	Tons of salt retained from FY2017 Salinity funded projects	*Carryonver of tons of salt retained since FY2004 (as applicable)	Cumulative Total of salt tons retained from Salinity funded projects	Final tons of Salt retained on BLM lands from Salinity funded projects
AZ	0	7747	7747	88733
CO	0	6000	6000	
NM	24731	16944	41675	
UT	12504	15325	27829	
WY	322	5160	5482	

*Numbers reported are subject to the updating of BLM data

STATE REPORTS

BLM State Offices submitted the following reports describing activities related to salinity Control programs on BLM-administered lands. State reports include descriptions of projects conducted with designated Salinity Program funding through the SWA subactivity as well as summaries of activities conducted through other programs and permitted users that reduce the transport of sediment and salt to the Colorado River. Vegetation left on the ground inhibits the transport of sediment and salts. The BLM's Fuels Treatment Effectiveness Monitoring Program manages areas that are likely to intersect with wildfires leading to the destruction of vegetation and leaving paths for sediment and salinity surficial movement.

Within the FTEM and per IM-2015-001 which states that "offices will complete a fuels treatment effectiveness assessment and input appropriate information into FTEM for all wildfires which start in, burn into, or burn through any portion of a fuel treatment area that has been completed and reported in the Hazardous Fuels Module of the National Fire Plan Operations and Reporting System from FY2003 to present." Utah has 171 records where a record for example would be the Scipio Summit Wildfire in which there is 90 days to report it into the FTEM database. The records for Utah account for 21 percent of all of BLM's records. Since 2003, BLM has accomplished millions of acres of fuels management treatments including thinning, mastication, and lop and scatter. Wildfires have intersected many of these fuels treatments therefore, demonstrating fuels program effectiveness for a minimum of 17,363 acres (70.3 km^2) burned in Utah.

Another BLM Program that impacts sediment and salinity transport is the Emergency Stabilization and Rehabilization (ES&R). Plans after the Toquerville Fire, Utah, in FY2012 were approved for reseeding to minimize soil erosion at a cost of $478,000 over a 4 year period; it burned 113 acres of public land. The action plan would not only establish a desired plant community but also suppress invasive annuals that can create a burn/re-burn cycle. The plan investigates understory and recovery to minimize erosion and reestablishment, fences, monitoring, soil stabilization, and road/trail diversions. The White Rock fire in Utah was approved for $1,636,000 in the BLM ES&R Program. Its plan of actions over three years was to apply a seed mix aerially, then use chaining to cover the seed. All livestock needed to be removed for two growing seasons so that the seeding could take effect. Based on site characterization of slope, topography, and ecology no additional measures were needed. The

BLM was treating an area of 3,542 acres that included 263 State acres and 212 private acres for a total of 4,017 acres for a total cost of $950,000. This area also included the possibility of sage grouse and pygmy rabbit.

ARIZONA

Across the Arizona Strip Field Office there are hundreds of erosion control structures which have been built to slow down erosional runoff, salinity, and valuable soil loss which would eventually end up in the Colorado River system. Over 200 of these structures are in the 1,000,000 acre Fort Pearce flood and salinity control sub-basin. Many of these structures have deteriorated or have been breached by heavy runoff. Without maintenance, these structures fill up over time with saline silt causing them to lose their holding and functional capacity. This project would inventory and maintain many of these structures which range from 50 feet to over a quarter mile in length. The structures would be inventoried, assessed for needed repairs, and prioritized for maintenance and repair work to be completed. In the past few years, increases in runoff have occurred across the unit due to the encroachment of Pinyon/Juniper (P/J) which has out competed the understory soil holding vegetation. This has allowed increased flows in nearly all drainages causing soil loss and salinity movement across the landscape. The purpose of this project was to slow the flow by repairing and maintaining the existing structures. Historic salt saving calculations allowable to carry on: **312 tons of salt savings per year**.

Current project: work in progress.

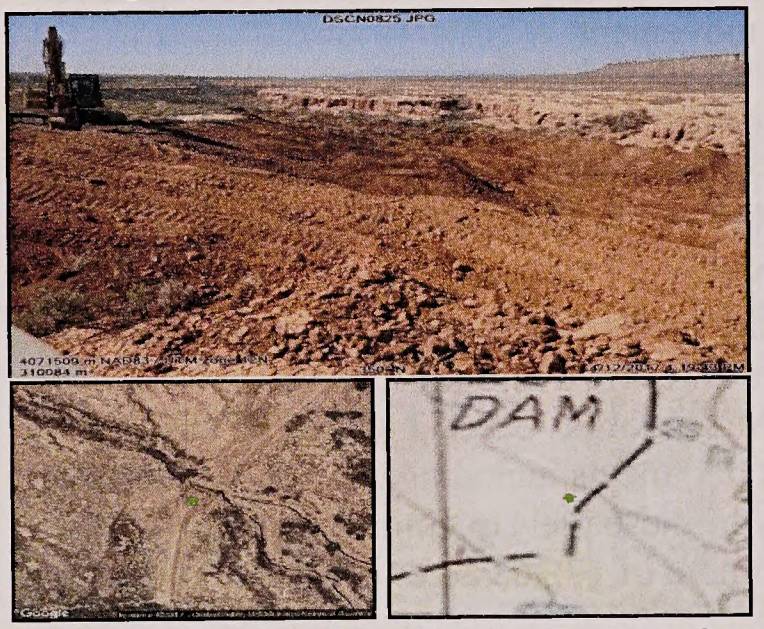


Figure 15 - Flat Top Dike #9: South view of repairs

COLORADO

Colorado River Salinity Summary of Monitoring Activities-WRFO (2008-2017)

The Colorado River Salinity funding (CRS Funds) for the White River have been used to augment existing USGS Streamflow monitoring sites, support USGS reports based on data collected, purchased equipment for BLM monitoring, and hire seasonal personal for field work. This funding resulted in an unprecedented amount of baseline data being collected and analyzed for the White River, Piceance Creek, and Yellow Creek drainages. The reports and data generated can be used to contributions of anthropogenic impacts to salinity in surface waters specifically, the salinity loads from the White River. The BLM funded a data repository to collect and assess existing water resource information http://rmgsc.cr.usgs.gov/cwqdr/Piceance/).

Data from the repository is being migrated to the Colorado Data Share Network (http://www.coloradowaterdata.org/). Accomplishments are similar to 2016 FAR.

USGS Yellow Creek Streamflow Site
Establishment of a new USGS streamflow site above Crooked Wash to bracket an area on the White River (White River Dome and Piceance and Yellow Creeks) known to be responsible for increasing salinity loads in the White River. Summary of all data available and funded by BLM is available at http://waterdata.usgs.gov/nwis/nwisman/?site_no=09306224&agency_cd=USGS.

Mancos Shale Oil and Gas Monitoring --CRVFO
The USGS in cooperation with the BLM will study the distribution, storage, and release of sediment, salinity, and selenium in area of Mancos Shale under two different land uses. The study will include 2 basins in Stinking Water Gulch near Rangely, CO, where one basin is dominated by oil and gas land use (Basin A) and the other basin is dominated by grazing/ranching land use (Basin B). The two basins are of similar size (~1.4 square miles) and similar slopes (~16 percent). This approach will provide insight into how different land uses effect the distribution, storage, and release of sediment, salinity, and selenium in surface-water systems.

Stinking Water Gulch-Grand Junction- UFO
The USGS in cooperation with the BLM are completing a study of four basins on BLM managed lands that are geographically similar and represent different land use histories on areas of Mancos Shale. This study will help resource managers gain insight on how different land uses may affect sediment, salinity, and selenium distribution and storage in Mancos Shale landscapes. The objectives of the project are to (1) characterize sediment, salinity, and selenium distribution and storage in four basins in Stinking Water Gulch under differing land uses (energy development and rangeland grazing); and (2) to evaluate the role of land use (energy development and rangeland grazing) and watershed processes that may increase sediment, salinity, or selenium inter-basin flux. Project is being updated and combined with additional projects.

Project Tasks and progress status through calendar year 2017:
The study includes four basins in Stinking Water Gulch near Rangely, Colorado. Two basins are dominated by energy development (Basin A1 and A2) and the other two basins are dominated by rangeland grazing (Basin B1 and B2). The basins in each basin group (A and B) include basins of similar size, aspects, soils, and slope. A comparison of sediment, salinity, and selenium storage characteristics between these two basin groups is used to evaluate the homogeneity of each system as well as to test for significant differences between the two groups. This approach aims to provide insight into how different land uses affect the distribution, storage, and release of sediment, salinity, and selenium in surface-water systems. Final results will be presented as part of a peer reviewed publication in calendar year 2017. The methods, background, and maps have been provided in the 2016 FAR. **Task 3.** Laboratory results are expected in September, 2017. Identification of the age of geomorphic surfaces within the basins will aid in interpretation of the timing and correlation of incision of the stream channel observed in the basins. **Task 4.** An assessment of hillslope erosion potential was begun December, 2015, using the USDA developed Water Erosion Prediction Project (WEPP) model (USDA, 1995). Comparisons of erosion

predictions from the WEPP interface between the two basin groups and results of simulations using WEPP:Road will provide a comparison of the hillslope processes and transport rates of these two systems and can aide in understanding potential sediment inputs and erosion attributable to road and well pad disturbances associated with land uses in the area. **Task 5.** A determination of the release rate for sediment, salinity, and selenium is being done through an assessment of volume changes within the channels of each basin in conjunction with annual load estimates from the WEPP analysis in 2017. The cross-section data is used with age dating to estimate channel incision rates and to evaluate total channel volume change through time (inter-basin sediment flux). Geomorphic surface present in the study area were identified, and cross sectional area at these locations were related to basin morphology to determine the erosional volume. Correlations between cross sectional area and downstream distance in each basin were determined (and example is shown in figure 5). Volume estimates were related to bulk density of soils in the areas (USDA, 2017). The volumes of each basin and along multiple points within each basin are used to compare sediment storage between basins and basin groups.

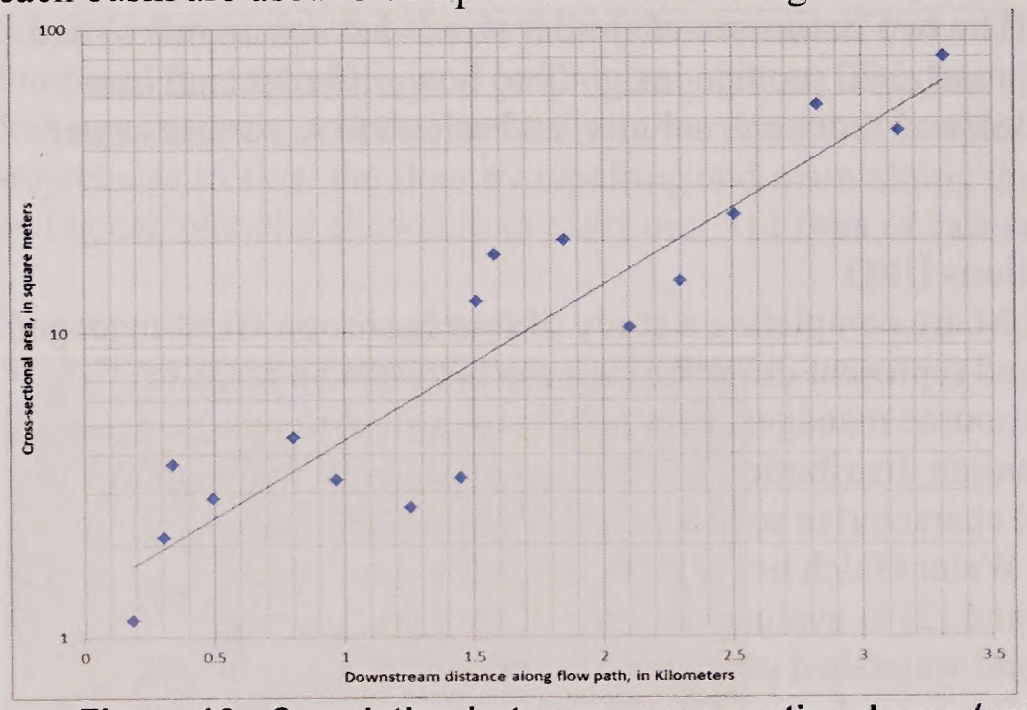


Figure 16 - Correlation between cross sectional area (volume of sediment removed below identified geomorphic surface) and downstream distance along study basin, Rio Blanco County, Colorado

Soil chemistry indicated varying concentrations of salts at locations sampled within a basin and between basins. Concentrations for salts showed a general decrease in concentration from higher-elevation terrace, lower-elevation terrace, and stream bed samples; whereas, selenium concentrations showed a general increase in concentration along this same progression of geomorphic surfaces. **Task 6.** Release of findings will be done in FY 2018 after receiving the remaining OSL-sample results and completion of the analysis. Water-quality data will be stored and available to the public through the USGS National Water Information System Web Interface (https://waterdata.usgs.gov/nwis). Results of this study will be published in a peer reviewed publication with applicable data sets in calendar year 2018.

Piceance Basin Salinity Groundwater Monitoring

In 2017, the USGS, in cooperation with the BLM, continued groundwater-monitoring efforts which began in 2008 in an areas of energy development in the Piceance Basin (Uinta and Green River Formations). Results from this monitoring effort indicate that (1) shallow aquifers are vulnerable to dramatic changes in water-levels and water quality (salinity) which may be the

result of solution mining or drilling activities including hydraulic fracturing; and (2) verified that plug and abandoned wells on BLM lands can act as conduits for the migration of gases and fluids from deeper sources to shallow, freshwater aquifers.

NEW MEXICO

San Juan River Basin Erosion Reduction

Focus is on noxious weed removal that threatens native riparian habitat, cutting trees, and showing lack of understory plant growth leading to loss of top soils due to rain/snowmelt events that lead to surface products in the stream. Sediment fences are being built, Youth Conservation Corps are involved to restore native vegetation and soil erosion and salinity will be reduced. Work is progressing.

La Manga Canyon Watershed Improvement

Degraded rangelands including sagebrush grasslands and P/J woodlands are on steep hillsides. The trees have minimal understory and excessive soil erosion. Sediment retention dams are being built with an estimated salt savings of **13.5 tons of salt per year** with life expectancy of 10-12 years (17 structures x 13.5 tons =) **229.5 tons** of salt retained in 2017.

Road Improvements- Roads have been regularly maintained and reconstructed to meet road standards. BLM's Civil Engineering technician developed the San Juan Public Roads Committee. This committee includes oil and gas producers, members of the local ranching community, and the Forest Service. The Committee has greatly improved the conditions of the local unpaved roads and has helped reduce the amount of sediment reaching the river systems from the road network. The Surface Protection staff at the BLM-FFO has completed several road and sediment retention upgrades for the fiscal year on BLM managed lands. Table 7 has a list of sediment retention and erosion control features installed or maintained for roads in FY17.

Table 7 - List of sediment retention and erosion control features installed or maintained for roads in FY17

Road name/Area	Miles of road improvement	# of sediment retention structures built	# of retention structures cleaned	# of culverts installed	# of sediment ponds built
Truby Road/Largo Canyon	2 miles	3	0	0	0
Bradly Road/Carrizo Canyon	0.75 miles	2	0	5	3
Newberry Road/Heartly Springs	0.5 miles	2	2	3	0
Simon Canyon Roads/Simon Canyon	25 miles	0	2	4	1
Cabin Canyon Road/Hart Canyon	1.5 miles	0	0	4	3
Carrizo Road/Carrizo Canyon	0.25 miles	0	0	3	1
La Plata Roads/La Plata River	1 miles	3	1	3	0

Hart Canyon Road/Hart Canyon	0.125 miles	1	0	2	0
Rodeo Development Unit	1 miles	1	0	4	0
Total	32.125 Miles	12 (**162 tons**)	5	28	8

Vegetation Treatments- Approximately **2,500 acres** of Federal land that was infested with weeds were sprayed to promote native vegetation recovery. Approximately **3000 acres** of weed treatment areas were monitored to establish the effectiveness of treatment. Farmington plans on applying Tebuthiuron (Teb) to approximately **13,300 acres** of sagebrush/grassland that had become unhealthy due to excessive densities of sagebrush. The project will begin in the fall when chemical applications are most effective. Funding has been allocated through the BLM/NMACD agreement for this project. Sagebrush in high densities tends to dominate the available soil moisture causing a loss of grass species and an increase in bare ground resulting in increased soil erosion. Tebuthiuron is applied at an appropriate rate to thin the sagebrush but not to eliminate it. Reducing sagebrush densities generally results in increased water availability for grass and forb species which typically increase ground cover and reduce soil erosion.

Pinyon/Juniper lop and scatter projects are beneficial to multiple resources on the landscape. Reestablishing a grass understory in project area increases infiltration rates, and decrease runoff and erosion during high flow precipitation events. Slash created by the project is used to protect seeded areas and decrease sheet runoff in the project areas. Seed mixes used include a wildlife forb component. Approximately **35 acres** of lop and scatter/ seeding have been completed with three types of Southwest Conservation Corps crews with an additional **500 acres** planned and funded for the fall. This amount may vary based on availability of contractors.

Silt Traps - 83 Applications for Permit to Drill (APDs) have been approved this year so far. Oil and gas operators have been granted an exemption from storm water runoff by the EPA. A common Best Management Practice (BMP) associated with the building of these well pads is the construction of silt traps to contain sediment runoff associated within the disturbance from the well pad. Each location generally had a minimum of one silt trap associated with it. For this fiscal year an **estimated 83 silt traps** were constructed, assuming 1 silt trap per well pad. Approximately **640 silt traps** have been built to help curtail sediment and salt loading and improve water quality in the San Juan Basin has resulted in about **19 tons** of salt retained. This is an aggregate estimation from road improvements and well pad construction projects.

San Juan River Watershed Salinity Reduction and Vegetation Management
Rangeland areas have been identified for vegetation treatments to increase native understory recovery. The funding for this project has been allocated through an agreement with NMACD to conduct aerial treatment of **13,300 acres** of decadent sagebrush communities lacking sufficient understories. The estimated salt yield for this project is **19,260 tons.** Approximately **35 acres** of P/J encroachment have been thinned and seeded; an approximate 500 acres of P/J encroachment in the Simon Canyon Watershed and Middle Mesa are being treated using heavy equipment year yielding an approximate **3,100 tons of** salt retained.

The **300 acres** of a previously treated area on Pump Canyon Mesa has been reseeded to ensure the success of the project. This yields approximately **860 tons of salt retained**. Approximately

40 acres of thinning projects in La Manga Canyon are being reseeded to ensure project success. There is also a project planned to mow approximately **300 acres** of Tamarix within Gobernador Canyon. NEPA compliance for the project is in the final stages. The salt cedar leaf beetle biocontrol has eliminated most of the salt cedar communities in the canyon, and this project is designed to seek and eradicate the remaining clusters with small equipment. This project yields approximately **1100 tons** of salt retained.

San Juan River Watershed Integrated Salinity Reduction

Funding for this project has been allocated to purchase materials used for sediment capture fences. Two major structures in Largo Canyon and La Manga Canyon are planned to have maintenance and upgrades.

Figure 17 - Current Lop and Scatter Project (SCC/USJW); La Manga Project Area (2 YRS post-treatment); Previous La Manga Project (1 year post-treatment) W/ Native Grass

Figure 18 - 2016 Teb Sagebrush Treatment 1

Figure 19 - Previous Teb Treatment (Post-treatment)

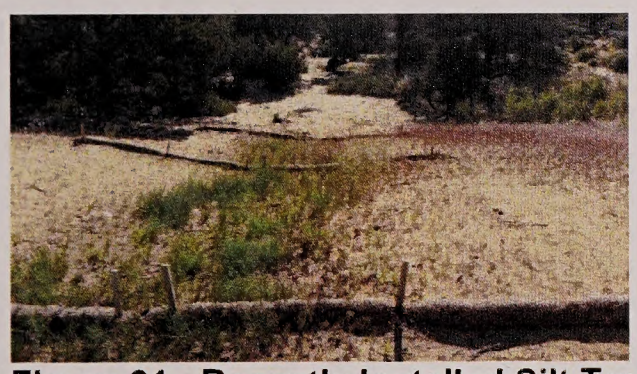


Figure 21 - Recently Installed Silt Trap (Simon Canyon)

Figure 20 - Previous Bradley Road (completely impassible-eroded by Carrizo Wash)

Figure 22 - Previous Bradley Road Ripped and Reseeded with Erosion Control Structure

Figure 23 - New Bradley Road Complete with Culverts and Sediment Retention Ponds

UTAH
Projects
Sediment Collection and Salinity Reduction on the GSENM
Eight Mile Salinity Control Structure

In 2013 and 2014 the Grand Staircase-Escalante National Monument repaired the Eight Mile Salinity Control Structure. In 2013 and 2014, the dam was extended approximately 150 feet, the spillway was repaired and armored with geotextile material and rip-rap, and approximately **13,000-15,000 yd^3** of salt-laden sediment was excavated from the control structure's primary settling pond to restore the holding capacity of the reservoir.

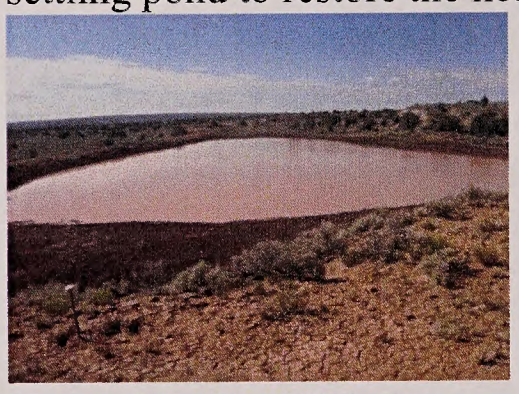


Figure 24 - Eight Mile Impoundment with water July 1, 2016 (Impoundment is approx. 5 acres)

In 2017 the Eight Mile Salinity Control Structure collected sediment and water during the summer 2016 monsoon rains. As of July 1, 2017, the pond was inundated with water so it was not possible to measure the depth of sediment that accumulated during the previous year. However, based on a 40-year average of 0.4 feet of sediment retention per year the estimated salt reduction was approximately **28.7 tons** in 2017. Work was completed during summer 2017 to repair a large washout in the Eight Mile dam and to lower the spillway and install culverts that will prevent water from flowing over the dam in the future.

Telegraph Flat and Finn Little Wash Salinity Control Structures

In 2016, five salinity control structures were cleaned and repaired on Telegraph Flat (Telegraph Flat 1-4 and Finn Little: (see map below), north of Hwy 89 at the southern end of the Monument. From August 2016 to July 1, 2017, the Telegraph Flat salinity control structures captured approximately **21.7 yd^3** of sediment, resulting in a total salt reduction of **1.5 tons** for the year.

The Finn Little structure was breached by flooding shortly after being repaired in 2016 and did not collect sediment for the year.

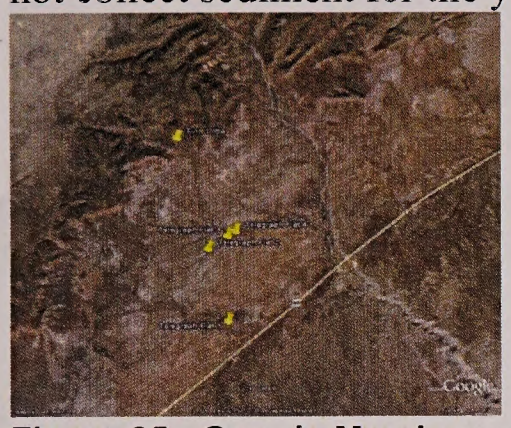


Figure 25 - Google Map Imagery of Telegraph Flat and Finn Little Wash Salinity Control Structures

Figure 26 - Telegraph Flat 1—Photos show wetted area where sediment collected in 2016-2017

Figure 27 - Photos of Telegraph Flat 2 (a), 3 (b), & 4 (c) showing the wetted area where sediment collected in 2016/2017

Paria Town Area, Kimble Valley 1, & Kitchen Corral 1 Salinity Control Structures
Three salinity control structures near the Old Paria Town were cleaned and repaired in the summer of 2016. Approximately **7,155 yd^3** of sediment was removed from the structures and used to maintain and repair the adjacent dams. The last clean-out dates are not known, but the salt reduction over the life of the three structures was approximately **479 tons.**

Kimble Valley 1 was cleaned in the spring of 2017. Approximately 18,252 yd^3 of sediment was removed from the structure and used to maintain and repair the adjacent dam. The salt reduction over the life of the structure was approximately **1,222 tons**. At Kitchen Corral 1 (see Paria Town area map), a small amount of material from the salinity control structure was used to repair a hole in the dam. The pond was not cleaned because it is full of water.

Kimble Valley Salinity Control Structures

Three salinity structures (Kimble Valley 2, 3, and 4) were cleaned in the Kimble Valley area of the Monument, north of Hwy 89 (see Kimble Valley Area Map), in 2014, but were not documented in the 2016 report. Over the last 3 years, the ponds collected approximately **2,800 yd^3** of sediment resulting in a salt reduction of **188 tons** that was previously unaccounted.

Figure 28 - Photos of Kimble Valley salinity control structures in 2017. Kimble valley 2 (a), 3 (b), and 4 (c)

Salinity Control Structures Cleaned and Repaired

Buckskin Area Salinity Control Structures

Four salinity control structures north of Buckskin Mountain were cleaned and repaired in the spring of 2017 in the area south of Hwy 89 (see Buckskin area map). Approximately **22,593 yd^3** of sediment was removed from the structures and used to maintain and repair the adjacent dams. The last clean-out dates are not known, but the salt reduction over the life of the four structures was approximately **1,513 tons.**

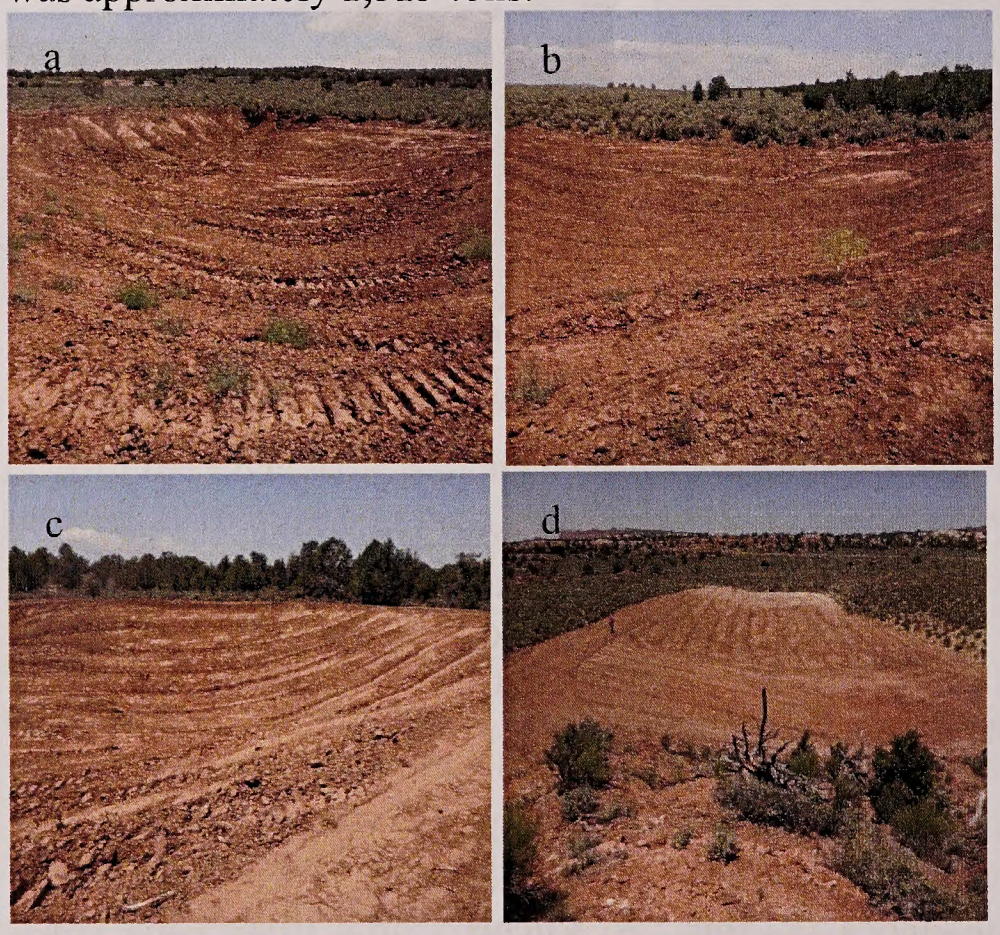


Figure 29 - Photos of Buckskin salinity control structures cleaned in spring 2017. Buckskin (a), (b), (c), and (d)

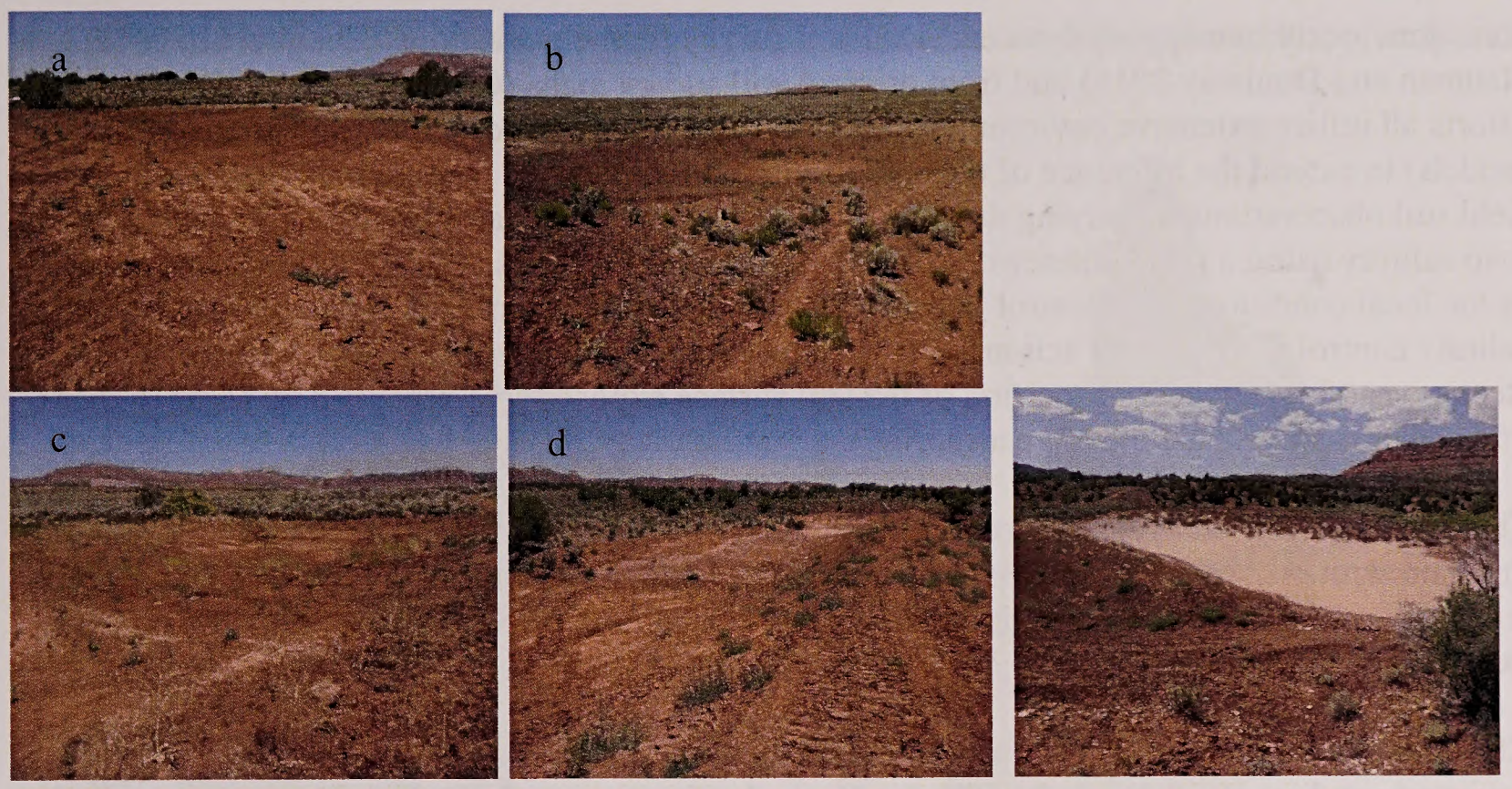


Figure 30 - Photos of Paria Town area, Kimble Valley 1, and Kitchen Corral 1 Salinity Control Structures. Paria Town (a), (b), (c); Kimble Valley (d); and Kitchen Corral (e)

**Summary: GSENM Salinity Work 2016—2017*

In summary, salinity control structures cleaned and repaired prior to July 1, 2017 collected 3,268 yd^3 of sediment (**219 tons** of salt). From July 1, 2016 to July 1, 2017, 15 additional structures were cleaned and repaired on the Monument. A total of **114,010 yd^3** of sediment was removed from these structures and used to repair and maintain the dams. The estimated total salt reduction over the lifetime of these structures is estimated at **7,600 tons***.

*High resolution surveys were not condueted to determine the geometry of GSENM salinity control structures. In general, struetures were assumed to have an ellipsoidal shape, and the following equation was used to determine the volume of sediment stored in the structure:

$$V = \frac{2}{3}\pi abc \qquad \text{eqn. 2}$$

where: V is the volume of the ellipsoid hemisphere, a is length, b is width, and c is depth. Average bulk density of the sediment is assumed to be 2.65 g cm^{-3} (4465 lbs yd^{-3}).

Colorado River Basin BLM Salinity Risk Assessment and Mapping

Identifying where moderate to high saline soils occur is critical for mitigating potentially deleterious impacts of land-use on Colorado River salinity in conjunction with erosive soils that could be more readily transported from public lands to the Colorado River and its tributaries. The soil survey geographic (SSURGO) database in the CRB is incomplete and where it is complete is often fairly coarse in scale, making it difficult for land managers to fully address these erosion prone areas.

The objective of this work is to identify saline soils in the upper Colorado River Basin (CRB) at high risk of erosion. This is being accomplished using digital soil mapping (DSM) strategies and soil erosion modelling applied within geographic information systems. Recent research has demonstrated increasing DSM success in mapping regional to global scale soil maps (including

areas previously unmapped) from archived soil survey field observations (Hengl et al., 2017; Nauman and Duniway 2016) and from original soil survey maps (Chaney et al. 2016). These efforts all utilize extensive environmental raster datasets (e.g. Landsat imagery, digital elevation models) to extend the inference of the soil observations available. The state of Utah has 9,368 field soil observations of varying detail available that can be leveraged in different ways to help map salinity using a DSM framework. The location of saline soils relative to drainages, as well as the local conditions that control erosion risk, are important factors to consider when designing salinity control management actions. Primary erosion risk factors include soil texture, slope steepness and length, and proportion of the soil surface exposed (not protected by rocks, lichens, litter, plants, and other protective armoring).

This work is being done in collaboration with the BLM SC and is funded by the BLM Salinity Program with in-kind contributions from the USGS Ecosystems Mission Area. The MUSLE erosion equation is likely to be used for the region based on NRCS suggestion and SC modeling experience with the region.

Electrical Conductivity (EC) – We chose to map at 30-meter resolution using a suite of raster environmental mapping layers (terrain, landform, landscape position, and geologic indices, see Nauman and Duniway 2016). We employed a machine learning algorithm using the 3D mapping strategy employed by Tomislav Hengl for the SoilGrids.org project using approximately 292 pedons (857 horizons) from the NRCS national laboratory database to train this model.

Risk Mapping – To create salinity risk maps, we will overlay erosion predictions and the new soil EC map to identify areas with saline soils that are in moderate to high risk of erosion. Using the sediment loss (mass/area) and estimates of potential total dissolved solids (TDS) based on soil EC, we can then estimate potential mass of TDS contributed from each 30-m pixel. Finally, by overlaying salinity risk maps and CRB hydrology layers (flow accumulation and stream networks), we can further refine saline risk mapping by identifying those areas with moderate to high saline soils that are more likely to contribute salts to perennial river and stream tributaries to the CO River.

Progress to date includes a hydrologically consistent D-infinity flow accumulation map for the entire upper UCRB for use hydrologic and erosion modelling; a new surface soil EC map of UCRB that will be used to identify saline soils (Fig. , RMSE = 1.8%); Soil erodability (K-factor) map of UCRB for erosion modelling (not shown, RMSE = 0.006%); a rainfall-runoff erosivity factor (R-factor) map of UCRB for erosion modelling (not shown); a bare ground (BG) exposure map of UCRB for erosion modelling (Fig. , RMSE = 12.5%); and a cover (C) factor map of upper CRB calculated from bare ground (BG) layer (C = [%BG]/[100+[100-%BG]]).

Deliverables--September 30, 2017. The following will be submitted to the BLM SC for review and comments: New salinity soil maps of UCRB along with metadata, accuracy reporting, and uncertainty analysis identifying any potential accuracy gaps; New maps of bare ground of the UCRB based on remote sensing; Salinity risk maps, depicting relative risk of lands contribution of TDS to the UCRB surface waters based on soil salinity, hydrological cost-path analysis, and

bare ground; March 31, 2018. Peer reviewed publication(s) documenting research approach and resulting risk mapping.

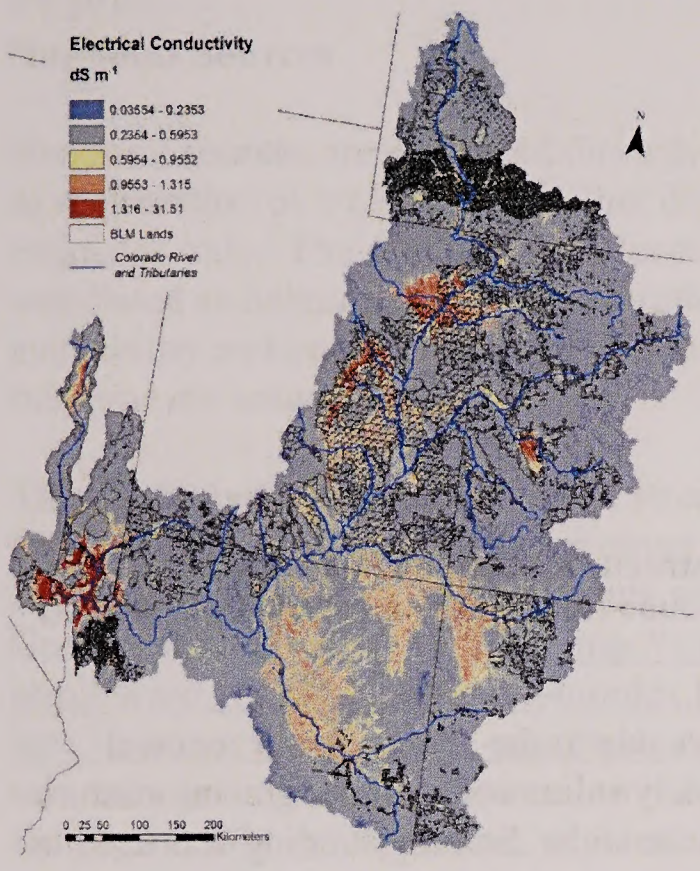


Figure 32 - New surface soil EC map in dS m-1 for Upper CO watershed (RMSE = 1.8%)

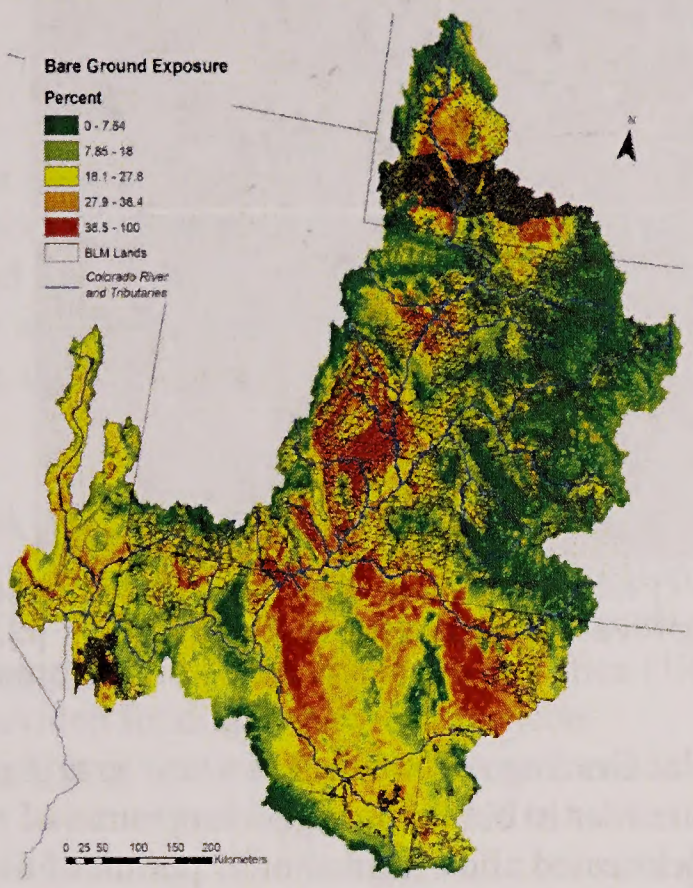


Figure 31 - Bare ground exposure map of basin (%). Computed from an AIC-based bi-directional stepwise regression (RMSE = 12.5%).

Five-Mile and House Rock Valley Area Salinity Control Structures

Four salinity control structures along House Rock Valley Road, south of Hwy 89 were cleaned and repaired in the spring of 2017 (see House Rock Valley area map; names are 5-Mile 1 & 2 and House Rock Valley 1 & 2). Approximately **17,031 yd^3** of sediment was removed from the structures and used to maintain and repair the adjacent dams. The last clean-out dates are unknown, but the salt reduction over the life of the four structures was approximately **1,141 tons**.

Figure 33 - Photos of House Rock Valley salinity control structures cleaned in Spring 2017. Five-mile 1 (a), Five mile 2 (b), House Rock Valley 1 (c), and House Rock Valley 2 (d).Big Flat Grazing Allotment

The Big Flat Grazing Allotment has a new grazing strategy due to the recent permit renewal process. In order to better manage a large area of moderately saline soils, a new grazing pasture has been delineated allowing a shorter period of use on these soils. Salinity funding was used to construct the multiple mile long pasture fence.

Progress: the fence is under construction. The extent of the fence will be known once all funds from all sources are utilized. The total fence length will be 5-miles long, creating a new pasture about 15,000 acres in size. The new pasture has 90 percent moderately to highly saline soils, and 90 percent of the saline soils are Chipeta soils.

Assumptions 3 cu ft of soil retained for each acre properly managed;

- 15,000 acres evaluated = 223,290 lb sediment/salt =**112 tons of salt**

Figure 34 - A grazing exclosure on right, in the new pasture area

WYOMING

The following information is an estimate of the amount of salt retained on the landscape because of actions taken by the Rock Springs, Rawlins, Kemmerer, and Pinedale Field Offices in FY2017.

Nonpoint Sources

Nonpoint sources are addressed through regular maintenance of BLM roads and facilities as well as reclamation of well pads and other disturbances. Salt savings from nonpoint sources are estimates only. The exact amount, location, and duration of surface disturbance and the associated sediment and salt concentrations are unknown. With the increase in soil data availability and improvements in GIS mapping, more accurate estimates are anticipated but as of this time are unavailable.

There have been increased levels of stream bank erosion associated with rain events. At the same time, broad scale vegetation cover has improved, which reduces nonpoint erosion and aids in grazing distribution. It is unknown which process dominates. The Wyoming Lands Conservation Initiative (WLCI) http://www.wlci.gov/ and Jonah Interagency Office (JIO) http://www.wy.blm.gov/jio-papo/index.htm provided funding for several projects http://www.wy.blm.gov/jio-papo/whatsgoingon.htm in the area that, while not focused on direct salt reductions, have the potential to reduce salt volumes by improving wildlife habitat and thus focus primarily on vegetation, which also benefits salinity. The volume and cost savings of these projects is unknown.

A variety of activities occurred as part of normal activities in FY 2016 that had the secondary impact of reducing non-point erosion on public lands. Because of the nature of these activities and nature of monitoring, exact volumes of salt saved and the efficiency of each activity are general estimates with a wide range of uncertainty. All of the figures below are for the Green River Basin southwestern corner of Wyoming that is covered the Rock Springs, Kemmerer, Pinedale, and portions of the Rawlins Field Offices. A portion of these activities occurred outside the Colorado River Catchment but much of the activity occurred within the area of interest.

The standard practices of road maintenance and grazing management help to reduce potential erosion. The costs and salt savings vary widely. Though not specific to salt savings, these practices are key to broad scale erosion reduction and salt retention. The following assumptions were made for the calculations below:

1. **Road Maintenance and Reclamation** (Approximately the same as 2006 - 2017)
350 miles of road maintained; Assumption: 2 cu yd of sediment retained per mile of road maintained; 93,807 lb of salt= **47 tons salt /sediment retained**

2. **One Reservoir Repair RFO**1000 cu yd of soil retained over life of project = 4,467,000 pounds sediment/salt =2233 tons sediment = **67 tons of salt**

Structures mentioned in previous reports for this area are still operating and have not required any maintenance expenditures. Given that they are still preventing the upstream advancement of

channel drops (headcuts), these structures could be considered to be highly cost efficient in preventing salinity contributions.

3. Grazing Management (Same as 2006-2017); 28,000 acres of land managed; Assumptions: 3 cu ft of soil retained for each acre properly managed

- 28,000 acres evaluated; 416,808 lb of salt = **208 tons of salt**

Cottonwood Creek Headcut Repair

This project plans to stabilize a headcut on Cottonwood Creek, which is an intermittent tributary to Lower Muddy Creek. In 2011, this reach of Cottonwood Creek failed PFC Assessments due to channel instability. A headcut is located in Section 6 of T13, R91 and is actively moving at an approximate rate of 10 feet per year. As the headcut migrates up gradient, it continues to contribute large amounts of sediment and salinity to down gradient reaches. Management actions such as grazing rotations, are currently in-place to allow for better growth of stabilizing riparian vegetation; however, the head cut is continuing to migrate. Efforts to repair or stabilize the headcut involve installing gradient control structures at the current headcut location.

The Cottonwood Creek Headcut Repair project was planned to go to construction in August of 2016. NEPA has been completed along with preliminary site visits with RFO operations staff. Boulders and rocks located on the hill slopes near the project area were used to construct the gradient control structures. NEPA analysis has been completed along with a Free Use permit for the boulders.

Muddy Creek Watershed Stabilization

Muddy Creek is a major tributary to the Little Snake River within the CRB. Cooperative efforts by BLM, WGFD, TU, USFWS, local conservation districts and landowners began in 2010 to restore degraded stream channels and improve riparian and aquatic habitat across the watershed. Efforts continue with 2 stream restoration projects planned for 2017 and 2018. One project is on East Muddy Creek (Phase II) while the other is on Littlefield Creek; both streams are tributaries to Muddy Creek. Engineered stream restoration designs will be implemented on both stream channels to restore natural channel stability, reduce in-channel erosion. Implementation of these projects will reduce in-channel erosion, which will in turn reduce sediment and salinity loadings to Muddy Creek. The Muddy Creek watershed encompasses 471 km^2 and is a major tributary to the Little Snake River within the Colorado River Basin.

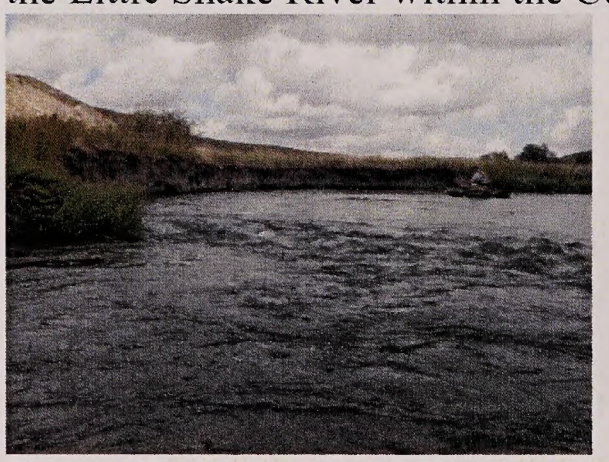


Figure 35 - Savery Creek Stabilization

The Savery Creek project is a multi-year project (approximately 4 stream miles) that will be completed in 3 to 4 phases. Reaches of Savery Creek below High Savery Reservoir exhibit

unstable channel characteristics including mass wasting on outside bends, excessive in-channel erosion and sedimentation and large width to depth ratios. All of these factors are contributing large amounts of sediment to downstream waterbodies within the CRB. The Savery Creek is a major tributary to the Little Snake River, located within the Upper Colorado River watershed.

This project proposed to implement natural channel design techniques on the target reaches that would reduce in-channel erosion, sedimentation and salinity loadings. Phase 1 is planned to go to construction in 2018. Preliminary surveys and conceptual engineered designs have been completed. Construction was initially planned for 2017, however, the complexity of permitting and designing a restoration project of this scale and consideration of the numerous concerns of all involved cooperators have delayed construction of Phase 1 to 2018. Conceptual plans have been completed which allows for the fund raising and permitting phases to begin.

Bureau of Reclamation
Colorado River Basin Salinity Control Program
Accomplishments for Fiscal Year 2017

Desert Lakes Monitoring

The monitoring of the Huntington Cleveland Project drainage basins has been completed this year. The salinity project, the pressurization of irrigation water in a high salinity soil, is complete. The monitoring of surface waters and groundwater's was reduced to once per quarter and end completely in calendar year 2016.

Over the salinity project's build, the elevation of the groundwater in these three basins has dropped thus causing an increase in TDS in the groundwater. The salt does not reach the surface as often since the water table is now lower. In the case of one area, Shoemaker Wash, the surface water has been all but eliminated as it now seldom flows and the canal is dry except on the occasion of a large storm.

Over the course of the project, it was determined from monitoring locations along the canals and the adjacent wells that the groundwater flows from the surface water to the groundwater. The amount of surface water in the system has decreased due to lower runoff water amounts. The Salt transport that occurred with flood irrigation, decreased. The elevation of the groundwater system has also decreased over time due to the lack of water infiltration from the flood irrigation.

The monitoring program was set up to monitor the drainage basins as well as the Desert Lake Complex under the assumption that improved water going in would result in improved water leaving the system and entering the Price River system and improve it. At the present time, that has not been the case. Desert Lake Complex is a dynamic entity that is under the influence of weather, natural disasters-forest fires, inflow from irrigation runoff and precipitation, and human manipulation. It was therefore determined that measurements from the individual washes would be more reliable in monitoring of the project rather than the downstream location below the Desert Lake Complex.

The TDS levels through the various surface flumes has declined overall. Various individual components of TDS are currently being analyzed and will be included in a monitoring report that is in the process of completion.

TDS Forecast Modeling

The Water Operations Group of Reclamation publishes a 24 month forecast for Lake Powell. This forecast includes a minimum, most likely, and maximum hydrology scenarios for the next 24 month period of time. The three scenarios (min, most, and max) are published in January, April, August, and October. The remaining months consist of a most likely hydrology scenario.

The Water Quality Group takes the forecasts and uses them to run the 2 dimensional model, Ce-Qual W2. This model is used to forecast temperatures, TDS, and occasionally DO (Dissolved Oxygen). In FY 2017 (WY 2017), the model has been run each month. The model continues to

be done in version 3.6 and the standardized Meteorological data file has been updated with each run. The various regressions (EC to TDS) used for the inflows to Lake Powell have also been updated for the most recent samples sent to the lab.

Colorado River Simulation System (CRSS)

In FY 2017 Reclamation continued modeling studies for the 2017 Triennial Review. Reclamation worked with USDA and BLM to refine salinity control projections from 2017-2035 under 4 scenarios. The revised salinity control scenarios include:

1. No Additional Controls beyond 2017 (1.33M tons control)
2. No Additional Controls beyond 2020 (1.39 M tons control)
3. Controls based on available funding by 2035 (1.66 M tons control)
4. Controlling 1.82M tons by 2035 (1.79M tons control)

Based on these salinity control scenarios revised Colorado River Simulation System (CRSS) results were presented to the Salinity Control Forum workgroup in February and September 2017. Presented results included average annual flow weighted salinity concentration and the probability of exceeding the numeric criteria at each of the three criteria stations.

Reclamation also provided additional data and figures required for the 2017 Review to document recent extensions to the historical record since the 2014 Review for salinity concentration throughout the 20 gauge monitoring network including the 3 numeric criteria location, below Hoover and Parker Dams and above Imperial Dam.

Reclamation has worked with CADSWES through FY17 to further enhance the CRSS salinity algorithms. A recent study complete by CADSWES developed new rules to estimate local inflow salt concentration when using the new multi-layered and - segmented reservoir user method for Lake Powell. This study was required to ensure the local salt inflow above Powell considered the impacts of changes in temporal routing of salt due to Lake Powel's new salt mass balance algorithm. During FY 2018 Reclamation will continue to test and evaluate the new multi-layered and -segmented reservoir user method.

Economic Impacts Model

In FY 2017 Reclamation continued to work with the Salinity Damages Task Force. Reclamation released multiple updates to the Salinity Economic Impacts Model (SEIM) throughout the year with the latest released version dated 09/29/17. This latest model includes updated model data provided from the Lower Basin States and requested changes based on reviews from the SEIM committee and Reclamation personnel completed during FY2017.

Reclamation and the SEIM committee worked together to draft a new 2017 Review Appendix F – Salinity Economic Impact Model Executive Summary, which presents a brief description of the steps recently completed to improve and verify the data and methods in this latest SEIM. Salinity damages estimates based on this latest SEIM were included in Appendix F and the main 2017 Review report.

Reclamation and the SEIM committee have also drafted and reviewed a SEIM User Documentation Report (technical appendix) that will be shared with the Salinity Forum Workgroup at the beginning of FY18. The purpose of the technical appendix is to present the individual pages in the SEIM to aid users in understanding how the SEIM is structured, and how it operates. The technical appendix discusses and presents the outputs, inputs, and equations included the SEIM.

Lastly, Reclamation and the SEIM committee worked with Reclamation's Lower Colorado Region personnel to draft and complete a new request for proposals to choose a contractor in FY2018 who will update Reclamation's SEIM, including the Arizona, California, and Nevada areas. Key project objectives include:

- Review, validate, and update the existing impact functions. Evaluate the applicability of the existing impact functions to model areas outside of the original areas for which they were developed.
- Update cost and other input values applied to existing impact functions for the following categories: residential, commercial, agricultural, water and wastewater utilities, industrial, groundwater, and water recycling.
- Identify and create new impact functions not currently considered in the existing SEIM and indicate the applicability of the new impact functions to all or any specific subareas.
- Update the existing SEIM to include the new input data and impact functions, and test the model ensuring all updates are functioning as intended.
- Prepare a report documenting the data analyses and methodology used to update the SEIM, including references to where the data are obtained and prepare a SEIM User Manual.
- Provide Model training.

The contract is projected to run from Nov 1, 2017 through Oct 31, 2019.

Science Team

To further improve and expand our knowledge of salinity control methods, data, and modeling within the Colorado River basin, the Salinity Science Team was created. This team incorporates technical experts and coordinators from each Federal agency (Reclamation, USDA, NRCS, BLM, and USGS) that provides salinity data and/or modeling and the Forum's Executive Director. For more information on the Science Team, please refer to the last section of the USGS Chapter in the 2006 FAR.

The following are some of the topics that were addressed by the Science Team during meetings held in January and August 2017:

1. Funding/contract update of approved Research, Studies, and Investigations (SIRs)
2. 2017 FOA
3. Review of Basins assessment ranking discussion; SPARROW II
4. Review of SIR proposals for funding and recommending to the Advisory Council's Technical Advisory Group (TAG) which proposals should receive funding.

5. Update on Paradox Valley Unit Groundwater model and simulations
6. Pah Tempe Study, Desert Lakes Monitoring
7. New areas for salinity studies
8. Economic Damages Model – Matching funds with Reclamation's Southern California Area Office to hire contractor to collect inputs. Solicitation out in FY18, looking for award in February 2018.
9. Future science direction, needs, priorities, and funding

Basinwide Salinity Control Program (Basinwide Program)

Funding Opportunity Announcement (FOA)

Applications to reduce salinity contributions to the Colorado River are being solicited through a FOA for both the Basinwide Program and Basin States Program (BSP). The FOA was released on August 4, 2017, and closes on November 14, 2017.

Applications will be selected through a competitive process under the evaluation criteria set forth in the FOA. Applications will be evaluated and ranked by an Application Review Committee (ARC). It is anticipated that $30-40 million will be awarded in the Basinwide Program and $5-10 million in the Basin States Program.

Price – San Rafael River Basins, Utah

Huntington Cleveland Irrigation Company (HCIC) Project (Project): The Project is located in northern Emery County, in and around the towns of Huntington, Lawrence, Cleveland, and Elmo. The Project was selected in the 2004 Request for Proposals (RFP) and awarded a cooperative agreement in September 2004. A new cooperative agreement was executed in November 2006, and was modified again in September 2009. Approximately 350 miles of open earthen canals and laterals are being replaced with a pressurized pipeline distribution system (Distribution System) to accommodate sprinkler irrigation on about 16,000 acres. Funding for this project is being shared between Reclamation's Basinwide Program, HCIC, NRCS's EQIP, the Parallel Program, and Rocky Mountain Power, formally known as Utah Power and Light. The last of Reclamation's share of $17,116,336 for the Off-farm Distribution System was obligated in 2008. Reclamation can provide up to an additional $6,000,000 in funding equally 50/50 with HCIC funds for completion of the Distribution System. Since 2009, Reclamation has provided over $4,000,000 in additional funding. The Project was completed in the first quarter of 2017 resulting in the annual reduction of 59,000 reportable tons of salt in the Colorado River at an anticipated cost of approximately less than $100/ton. Of the 59,000 tons of salt, 13,000 are attributed to the Off-Farm Distribution System and 46,000 tons are attributed to the On-Farm Distribution System and the on-farm salinity control measures (sprinklers).

Blue Cut/Mammoth Unit, Cottonwood Creek Consolidated Irrigation Company Salinity Project: The $5,500,000 Blue Cut/Mammoth Unit, Cottonwood Creek Irrigation Company Irrigation Project was selected from the applications received in the 2012 FOA. A cooperative agreement was executed in August 2013. This project will replace approximately 45.6 miles of earthen canals and laterals with a pressurized pipeline system resulting in the reduction of 3,789 reportable tons per year of salt in the Colorado River at an anticipated cost of approximately

$67.57 per ton of salt. The pressurized pipeline will serve 5,680 acres resulting in additional on farm salt savings. Pipeline construction was complete as of September 8, 2016. Approximately 55 percent of the served acreage is under contract for on-farm improvements. The recipient continues to add valves and meters as those systems come online. It will take 2 to 3 more years for NRCS to contact the remainder of the acreage and the last canals can be taken out of service.

Manila-Washam Salinity Area, Utah

South Valley Lateral Salinity Project: This project is located in Daggett County south of the town of Manila, Utah. It was selected from the applications received in the 2012 FOA and was submitted by the Sheep Creek Irrigation Company. A cooperative agreement was executed in May of 2013, for the amount of $4,026,264.75. This project replaced approximately 27,400 feet of earthen laterals with irrigation pipe resulting in the annual reduction of 3,373 reportable tons of salt in the Colorado River at an anticipated cost of approximately $55.57 per ton of salt. The project began in the fall of 2014, and went into service for the 2015 irrigation season ahead of schedule and under budget. The recipient was approved to use unexpended funding to make improvements to their Antelope Wash Lateral. That construction was completed in early 2017, and went into service for the 2017 irrigation season.

Big Sandy Project, Sweetwater County, in the vicinity of Farson and Eden, Wyoming

Eden Valley, Farson/Eden Pipeline Project: This project was selected in the 2008 FOA. A Cooperative Agreement was executed in February of 2009, for the amount of $6,453,072. This project will replace approximately 24 miles of earthen laterals with irrigation pipe resulting in the annual reduction of 6,594 reportable tons of salt in the Colorado River at an anticipated cost of approximately $52.57 per ton of salt. Laterals E-7, E-8, and E-13 are completed, and work on the West Side Canal was completed and operational in the spring of 2014. Due to some pipeline leaks the Recipient is withholding retainage funds through the end of the 2016 irrigation season to ensure all leaks had been addressed. That retainage was paid in December of 2016 allowing close-out of the project.

West Blacks Fork Salinity Area, Wyoming

Austin/Wall Off-Farm Irrigation Project: This project is located in Uintah County in the vicinity of Lyman, Wyoming. It was selected from the applications received in the 2012 FOA and was submitted by the Austin/Wall Irrigation District. A cooperative agreement was executed in May 2013, for the amount of $1,350,000. This project will replace approximately 32,000 feet of earthen canal and laterals with irrigation pipe resulting in the annual reduction of 1,092 reportable tons of salt in the Colorado River at an anticipated cost of approximately $57.55 per ton of salt. The project began construction in the fall of 2016, and was completed and went into service in the spring of 2017.

Gunnison Basin, Colorado

UVWUA Phase 8 – ESL: As a result of the 2012 FOA, the UVWUA was selected to be awarded a $3.5 million cooperative agreement for Phase 8 of the ESL. This phase involves piping an additional 14.1 miles of laterals off of the South Canal, East Canal and Loutzenhizer, resulting in an expected annual salt reduction of 3,307 tons, at a cost effectiveness of $49.86 per ton. The cooperative agreement was executed in FY 2014. Construction began in the summer of 2015 and will be complete in 2018.

Cattleman's Harts, Hart/McLaughlin, Rockwell, Poulsen Ditches: Selected in the 2012 FOA, this project involves piping a portion of the Cattleman's Ditch, operated by the Cedar Canon Iron Springs Ditch and Reservoir Company. The ditch is supplied by Crystal Creek, a tributary to the Gunnison River near Crawford, Colorado. In July 2013, Reclamation entered into an agreement to provide up to $2.01 million to pipe 6.3 miles of existing laterals with an expected salt load reduction of about 1,855 tons/year, at a cost effectiveness of $47.72 per ton. Construction began in the fall of 2015 and will be completed in the spring of 2018.

Cattleman's Ditch Salinity Control – Phase 2: Selected under the 2015 FOA, the Cedar Canon Iron Springs Ditch and Reservoir Company was awarded a $2.67 million cooperative grant to pipe approximately 6.0 miles of existing, unlined earthen irrigation canal and laterals located near Crawford, Colorado and along Alkali Creek, a tributary to the Gunnison River. This will result in an annual salt load reduction of approximately 2,183 tons to the Colorado River, at a cost effectiveness of $51.00 per ton. The piping project will consist of buried HDPE, PVC, and gravity flow pipe. The cooperative agreement was executed in April 2016, and construction will begin in October of 2017. It is expected to be completed in the spring of 2019.

Clipper Center Lateral Pipeline Project: Selected under the 2015 FOA, the Crawford Clipper Ditch Company was awarded a $3.15 million cooperative grant to pipe approximately 4.3 miles of existing, unlined earthen irrigation canals located near Crawford, Colorado and along Cottonwood Creek, a tributary to the Gunnison River. This will result in an annual salt load reduction of approximately 2,606 tons to the Colorado River, at a cost effectiveness of $50.43 per ton. The piping project will consist of buried PVC and HDPE pipe. The cooperative agreement was executed in March 2016, and construction will begin in 2018. It is expected to be completed in 2019.

North Delta Canal – Phase 1: Selected under the 2015 FOA, the North Delta Irrigation Company was awarded a $5.56 million cooperative grant to pipe approximately 5.97 miles of existing, unlined earthen irrigation canals located near Delta, Colorado and along the north side of the Gunnison River. This will result in an annual salt load reduction of approximately 4,383 tons to the Colorado River, at a cost effectiveness of $52.92 per ton. The piping project will consist of 1.41 miles of buried HDPE pipe and 3.02 miles of gravity flow pipe (piping is providing a 1.54 mile shortcut). The cooperative agreement was executed in April 2016, and construction will begin in 2018. It is expected to be completed in the spring of 2020.

Orchard Ranch Ditch Piping Project: Selected under the 2015 FOA, the Orchard Ranch Ditch Company was awarded a $1.28 million cooperative grant to pipe approximately 2.0 miles of existing, unlined earthen irrigation canals located near Orchard City, Colorado and along Surface Creek, a tributary to the Gunnison River. This will result in an annual salt load reduction of approximately 1,004 tons to the Colorado River, at a cost effectiveness of $53.16 per ton. The piping project will consist of buried HDPE pipe. The cooperative agreement was executed in April 2016, and construction will begin in 2018. It is expected to be completed in 2019.

Fire Mtn. Canal Salinity Reduction Piping Project: Selected under the 2015 FOA, the Fire Mountain Canal and Reservoir Company was awarded a $2.95 million cooperative grant to pipe or abandon approximately 4.24 miles of existing, unlined earthen irrigation canals located near Hotchkiss, Colorado and along the north side of the North Fork of the Gunnison River. This will result in an annual salt load reduction of approximately 2,365 tons to the Colorado River, at a cost effectiveness of $52.07 per ton. A portion of the project is funded by the USDA, NRCS, through the Regional Conservation Partnership Program (RCPP) in the amount of $1.32 M. The cooperative agreement was executed in September 2017, and construction will begin in 2018. It is expected to be completed in the spring of 2019.

UVWUA Phase 9 – ESL: As a result of the 2015 FOA, the UVWUA was selected to be awarded a $5.4 million cooperative agreement for Phase 9 of the ESL. This phase involves piping or abandoning an additional 21.6 miles of laterals off of the Selig and East Canals, resulting in an expected annual salt reduction of 6,030 tons, at a cost effectiveness of $37.07 per ton. A portion of the project is funded by the USDA, NRCS, through the RCPP. The cooperative agreement was executed in September 2017. Construction is expected to begin in 2018 and will continue to 2021.

Grand Valley, Colorado

Grand Valley Irrigation Company (GVIC) Canal Improvement Grant 2012: As a result of selection under the 2012 FOA, the GVIC was selected to be awarded a $4.9 million cooperative grant to line about 2.4 miles of their main canal within the Grand Valley. A salt loading reduction of approximately 4,001 tons annually is expected, at a cost effectiveness of $53.31 per ton. The canal lining will consist of a PVC membrane with a shotcrete cover. The cooperative agreement was executed in FY 2014 and construction began in December 2014. It is expected to be completed in the spring of 2018.

Grand Valley Irrigation Company (GVIC) Canal Improvement Grant 2015: Selected under the 2015 FOA, the GVIC was awarded a $2.8 million cooperative grant to line approximately 1.65 miles of their main irrigation canal within the Grand Valley. This will result in a salt load reduction of approximately 2,363 tons annually at a cost effectiveness of $49.64 per ton. The canal lining will consist of a 30-mil PVC membrane with 3-4 inches of shotcrete cover. The cooperative agreement was executed in August 2016, and construction will begin in January 2018. It is expected to be completed in 2020.

Grand Valley Water Users Association (GVWUA) Government Highline Canal – Reach 1A Middle: Selected under the 2015 FOA, the GVWUA was awarded a $3.6 million cooperative grant to line approximately 0.97 miles of their main irrigation canal within the Grand Valley. This will result in a salt load reduction of approximately 2,583 tons annually at a cost effectiveness of $58.63 per ton. The canal lining will consist of a 30-mil PVC membrane with 3-4 inches of shotcrete cover. The cooperative agreement was executed in April 2016, and construction began in November of 2016. It is expected to be completed in December 2018.

Paradox Valley Unit (PVU), Colorado

This project intercepts extremely saline brine (260,000 mg/l total dissolved solids) before it reaches the Dolores River and disposes of the brine by deep well injection (injection interval about 14,000 feet below ground surface).

Induced seismicity and the pressure necessary to inject the brine into the disposal formation at 14,000' have been the limiting factors of the project. Since injection rate reductions in 2013 and 2017 have substantially reduced the injection pressure, seismicity is now the main concern. Although the projected life of the well was estimated to be 3 to 5 years, new geomechanical and flow modeling is now being conducted to determine the injection well life based on seismicity and well performance.

The project continues to intercept and dispose of 95,000+ tons of salt annually.

Alternatives Study

An Alternatives Study/EIS process to evaluate alternative methods for salt disposal at Paradox is continuing with three alternatives and a "no action" alternative being evaluated. The three action alternatives are a second injection well, evaporation ponds, and zero liquid discharge technologies. As these alternatives are being developed, Reclamation continues to have related meetings and discussions with the BLM, EPA, Colorado Department of Public Health and Environment, and other stakeholders. A draft Alternatives EIS is scheduled to be completed by the end of FY19 with a ROD scheduled to be issued in FY20.

Table 8 – Paradox Well Injection Evaluation

Injection Period	Operational Days[1]	Pressure Start	High Pressure During Period	Injection Period Net Pressure Change	Tons of Salt Injected[2]	No. of Induced Seismic Events	Maximum Magnitude of Induced Seismic Events	Estimated Tons of Salt Entering the River[3]
Jan-May '02[4]	148	1609	4432		52,860	25	2.9	8,469
June-Dec '02[5]	178	929	4593	161	58,953	34	2.2	8,333
Jan-May '03[5]	144	1172	4627	34	53,173	27	2.1	18,037
June-Dec '03[5]	184	1154	4675	48	59,530	106	2.3	11,185
Jan-May '04[6]	140	1201	4640	-35	51,449	47	2.4	20,225
June-Dec '04[7]	160	1091	4541	-99	51,589	57	3.9	6,442
Jan-May '05[5]	140	1038	4736	195	55,024	69	2.4	14,011
June-Dec '05[8]	148	1203	4750	14	46,551	31	2.6	38,582
Jan-June '06[9]	138	375	4680	-70	44,779	10[10]	2.4	53,039
July-Dec '06[5]	162	1084	4797	117	56,920	13[10]	2.1	18,605
Jan-June '07[5]	159	1066	4796	-1	56,068	7[10]	1.1	19,728
July-Dec '07[5]	163	1232	4712	-84	57,395	31	2.6	11,279
Jan-June '08[11]	160	1152	4813	101	54,720	47	1.3	15,305
July-Dec '08[5]	162	1263	4822	9	56,734	61	2.1	16,378
*Jan-Mar '09[5]	84	1246	4756	-66	29,163	20	2.6	22,029
Apr-Sept '09[12]	160	1157	4891	135	55,083	70	2.7	16,507
Oct '09-Mar '10[5]	153	970	4930	39	51,589	91	2.9	32,876
Apr '10-Sep '10[5]	162	1347	4990	60	55,747	75	2.7	17,223
Oct '10-Mar '11[5]	161	1378	5000	10	55,501	43	2.9	22,916
Apr '11-Sep '11[13]	158	1276	5102	102	54,422	63	2.7	11,591
Oct '11-Mar '12	162	1282	5115	6	56,531	59	2.5	21,003
Apr '12-Sep '12	161	1417	5108	-7	55,605	116	1.9	5,507

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1 Operational days include partial days of operation which accounts for variations in tons of salt injected
2 Tons of salt injected based on 260,000 mg/L. Brine concentration varies slightly due to seasonal and environmental fluctuations.
3 Tons of salt entering the river based on regression equations (Ken Watts, USGS Administrative Report – "Estimates of Dissolved Solids Load of the Dolores River in Paradox Valley, Montrose County, CO, 1988-2009, August 5, 2010"). The 2010 FAR contained erroneous estimated tons of salt entering the river.
4 Begin 100% brine injection
5 No problems
6 Down from 3/1/04 through 3/7/04 for mechanical problems
7 Implemented quarterly 10-day shutdown schedule from 9/22 to 10/22; M3.9 earthquake on 11/7; plant shut down until 11/18; discontinued 10-day shutdown schedule
8 Down from 11/13/05 through 12/31/05 for mechanical problems
9 Down from 1/1/06 through 1/19/06 and 2/16/06 through 3/2/06 for mechanical problems
10 Seismic data for 2006 and the first half of 2007 is likely incomplete due to seismic network problems
10 Seismic data for 2006 and the first half of 2007 is likely incomplete due to seismic network problems
10 Seismic data for 2006 and the first half of 2007 is likely incomplete due to seismic network problems
11 Down from 4/16-17/08 for mechanical problems
12 Down from 5/18-19/09 for mechanical problems
13 Down from 9/18-9/20 for communication link failure.

* Biannual shutdown schedule changed from winter/summer to spring/fall

Injection Month	Min Injection Pressure	Max Injection Pressure	Monthly Pressure Change	Tons of Salt Injected[1]	Estimated Salt Load in tons[2]	# of Induced Seismic Events M ≥ 0.5[3]	Max Mag of Seismic Events	No. of Seismic Events in Past 12 Months, M ≥ 0.5	Comments
Jan-13	2,733	5,111		8,115	263	15	4.4	69	January 23 M4.4 Earthquake - Shut Plant Down 1/23/13 - 2200 hours; Injection rate prior to earthquake was 230 gpm, shut down schedule was two twenty day shut downs annually
Feb-13	893	2,733	-2,378	0	1,324	3	1.7	70	Plant Down
Mar-13	500	893	-1,840	0	2,600	1	1.2	64	Plant Down
Apr-13	390	4,250	3,357	4,064	3,351	4	0.7	60	Start up on April 17 after January 23 M4.4 earthquake. Begin 33 hour weekly shut down schedule and continue to use 2.125" plungers until new 2" plungers are installed.
May-13	3,290	4,452	202	8,752	1,535	3	1.8	58	33 hour weekly shut down schedule, 2.125" plungers
Jun-13	3,948	4,685	233	8,311	2,089	2	0.8	52	Continued 2.125" plungers to June 5 - Installed 2" plungers on June 5, began 18 hour shut down schedule on June 11
Jul-13	4,143	4,740	55	8,457	1,823	1	1.2	47	No significant down time
Aug-13	4,218	4,722	-18	8,629	289	1	0.5	47	No significant down time
Sep-13	3,513	4,770	48	7,557	659	0	0.3	43	PLC problems - plant down from 9/19 through 9/22. 18 hour weekly shut downs suspended from 9/22 to 11/12
Oct-13	3,683	4,770	0	9,610	195	1	1.2	35	No significant down time

Nov-13	4,208	4,803	33	8,814	577	2	0.7	36	No significant down time
Dec-13	4,195	4,758	-45	8,713	778	1	0.8	34	No significant down time
Jan-14	4,202	4,739	-19	8,584	681	0	0.3	19	No significant down time
Feb-14	4,187	4,745	6	7,760	925	4	1.7	20	No significant down time
Mar-14	4,193	4,757	12	8,713	1,275	3	1.5	22	No significant down time
Apr-14	4,206	4,772	15	8,159	675	1	0.9	19	No significant down time
May-14	4,215	4,775	3	8,711	258	2	1.2	18	No significant down time
Jun-14	4,217	4,769	-6	8,381	186	0	N/A	16	No significant down time
Jul-14	4,218	4,778	9	8,428	236	2	2.3	17	No significant down time
Aug-14	4,212	4,781	3	8,645	-300	0	N/A	16	No significant down time
Sep-14	4,206	4,772	-9	8,215	-832	0	1.8	16	No significant down time
Oct-14	4,215	4,776	4	8,773	758	2	1.0	17	No significant down time
Nov-14	4,223	4,773	-3	8,297	2,992	3	1.1	18	No significant down time
Dec-14	4,205	4,778	5	8,272	4,202	0	0.4	17	No significant down time
Jan-15	4,202	4,766	-12	8,731	3,246	2	1.0	19	No significant down time
Feb-15	4,202	4,754	-12	7,775	4,353	2	1.1	17	No significant down time
Mar-15	4,228	4,766	12	8,457	6,282	0	N/A	14	No significant down time
Apr-15	4,196	4,760	-6	8,230	3,959	2	0.6	15	No significant down time
May-15	4,190	4,763	3	8,512	1,708	1	0.7	14	No significant down time
Jun-15	4,209	4,761	-2	8,279	174	2	0.9	16	No significant down time
Jul-15	4,227	4,777	16	8,637	-336	1	1.1	15	No significant down time
Aug-15	4,164	4,797	20	8,614	-478	3	1.6	18	No significant down time
Sep-15	4,239	4,787	-10	8,124	810	2	1.0	20	No significant down time
Oct-15	3,598	4,767	-20	7,863	733	3	0.9	21	SCADA upgrade 10/26-10/29; plant down for 76 hours
Nov-15	4,206	4,737	-30	8,594	2,358	4	1.0	22	No significant down time
Dec-15	4,195	4,754	17	8,494	2,589	1	0.8	23	No significant down time
Jan-16	4,194	4,762	8	8,671	3,227	4	1.6	25	No significant down time
Feb-16	4,133	4,749	-13	7,824	8,965	9	2.1	32	No significant down time

Mar-16	4,214	4,766	17	8,655	5,070	5	1.5	37	No significant down time
Apr-16	4,228	4,773	7	8,367	3,380	2	1.1	37	No significant down time
May-16	4,060	4,774	1	8,655	2,551	4	1.4	40	No significant down time
Jun-16	4,204	4,785	11	8,163	855	3	1.4	41	No significant down time
Jul-16	4,233	4,771	-14	8,704	990	4	1.4	44	No significant down time
Aug-16	4,242	4,791	20	8,485	-1,780	2	0.7	43	Seismic event count for August may be under-represented
Sep-16	4,269	4,797	6	8,376	793	2	1.2	43	Seismic event count for September may be under-represented
Oct-16	4,250	4,807	10	8,844	1,072	3	1.1	43	No significant down time
Nov-16	4,283	4,815	8	8,225	1,827	8	1.3	47	No significant down time
Dec-16	4,220	4,805	-10	8,540	4,478	8	1.6	54	PLC problems - plant down 4 hours
Jan-17	4,254	4,822	17	8,566	8,969	5	1.1	55	No significant down time
Feb-17	4,300	4,820	-2	7,760	8,029	1	0.3	47	No significant down time
Mar-17	1,515	4,801	-19	3,021	3,706	7	2.9	49	Plant down from 3/12 to 3/31 for M 2.9 earthquake
Apr-17	1,196	4,447	-354	6,088	-64	11	1.8	58	Plant down from 4/1 to 4/7 for M 2.9 earthquake; Injection resumed on 4/7 at 176 gpm and 6 hour weekly shutdowns
May-17	4,196	4,603	156	8,182	633	4	1.4	58	No significant down time
Jun-17	4,311	4,634	31	7,848	820	3	1.5	58	No significant down time
Jul-17	4,368	4,677	43	8,103	884	2	0.6	56	No significant down time
Aug-17	4,380	4,649	-28	8,144	1,424	15	2.5	69	No significant down time
Previous 12 Months			-148	91,697	32,571	69	2.9		
Previous 24 Months			-138	192,296	62,319	112	2.9		

[1]Tons of salt injected based on 260,000 mg/l. PVB density varies slightly due to seasonal and environmental fluctuations.
[2] Salt load is estimated based on regression equations developed by USGS (Ken Watts, USGS Administrative Report - "Estimates of Dissolved Solids Load of the Dolores River in Paradox Valley, Montrose County, Colorado, 1988 through 2009, dated August 5, 2010") and provisional data provided by USGS. Some daily EC and streamflow discharge values are estimates. See Salt Load Notes tab.
[3]See Seismicity Notes tab

Basin States Program (BSP)

Public Law 110-246 amended the Act creating the BSP to be implemented by the Secretary of Interior through Reclamation. Section 205(f) of the Act was amended to provide that cost share obligations be met through an up-front cost share from the Basin Funds. The amendment also authorizes Reclamation to expend the required cost share funds through the BSP for salinity control activities established under Section 202(a)(7) of the Act.

Reclamation has determined that agencies within the upper Basin states to be appropriate partners and has executed cooperative agreements to utilize the services of these state agencies to assist in seeking and funding cost-effective activities to reduce salinity in the Colorado River system. Activities will also benefit the upper Basin states by improving water management and increasing irrigation efficiencies.

Utah Department of Agriculture and Food (UDAF)

The Utah Department of Agriculture and Food received two projects from Reclamation's most recent FOA. One project is with Sheep Creek Irrigation Company, Manila, Utah and is a canal piping project that will retain 1,474 tons of salt per year at a cost of $1,947,929.99. The project is titled "Antelope and North Laterals Salinity Project" and will pipe two laterals of the Sheep Creek Canal. The other project is in the Vernal area and will pipe the Rock Point Canal retaining 740 tons of salt with a total project cost of $1,422,849.00, with $976,549.00 coming from Basin States Program funds.

During the 2016-2017 winter construction season, Sheep Creek Irrigation Company substantially completed the piping of the Antelope and North laterals. Both of these new pipelines were put in use during the 2017 irrigation season. During the fall of 2017 Sheep Creek Irrigation Company intends to complete its project.

Rock Point Irrigation Company has hired an engineering firm, procured final design, and purchased pipe for their project. The pipe is stored at previously approved storage sites not requiring Cultural Resource or NEPA clearance. Rock Point Irrigation Company has obtained all easements and is awaiting NEPA clearance to begin construction. They intend to start construction late fall of 2017. Because Steinaker Dam will be drained, Rock Point Irrigation Company will need to adjust their construction time line and method of water delivery until Steinaker is refilled.

UDAF, at the direction of the Advisory Council and Reclamation, continues to employ the Uintah basin salinity coordinator using BSP funds. The value of this coordinator has been demonstrated by the success of obtaining four 2015 FOA projects. These projects were competitive because of the coordinator's efforts to confederate historically opposing companies into accepting unified systems that improve each company and the significant cost share match being provided by local funding sources to buy down the cost per ton of salt control. Improvements with the Ute Tribe have also been made and it is anticipated that in future FOA's

the tribe will submit applications. UDAF feels that using BSP funds for this position has greatly benefited the salinity control program in the Uintah Basin area. The coordinator has also been successful in helping entities submit applications with the NRCS Regional Conservation Partnership Program.

Colorado Department of Agriculture - Colorado State Conservation Board (CSCB)

In Colorado, the Basin States Program (BSP) has been delivered through six local Conservation Districts that operate within the boundaries of the approved salinity control areas in the state. These salinity control areas include the Silt Mesa, Grand Valley, Lower Gunnison, McElmo Creek and Mancos River salinity areas. The Bookcliff, Mesa, Delta, Shavano, High Desert (formerly Dolores), and Mancos Conservation districts receive funds from the Colorado Department of Agriculture (CDA) which, prior to 2017, had received projects to implement based upon the agreement with Reclamation. There is an active agreement in place, however, due to no new BSP projects being assigned to CDA, administrative funding for a CDA salinity coordinator was insufficient so this position remained vacant.

Historically, the projects were planned, designed and certified by NRCS or Conservation District employees. Eleven District employees were paid from BSP Technical Assistance (TA) funding earned by NRCS in Colorado and provided to the Conservation Districts through CDA. Due to staffing constraints and an unusually high EQIP workload, the NRCS withdrew future participation in the BSP and will no longer administer Salinity Technicians under this agreement after remaining funds are spent.

Over the last year, the Work Group explored the value of State Agriculture Agency participation for implementing the BSP, coordinating with ditch companies to apply for the FOA, and assisting in local oversight/implementation of some FOA projects. Because of NRCS' EQIP workload demands and unusually high staff vacancies, the Colorado State NRCS office elected not to screen and submit new EQIP ineligible applications. Historically, applications have been funded in order of cost effectiveness and any future applications will be treated similarly. In the future, applications that are strategic in nature and result in less than $150/ton would be eligible for the BSP, so long as NRCS is not expected to provide NEPA or engineering documentation and provided the applications are awarded through a competitive process. The NRCS formula is used to calculate cost effectiveness and salt loading data.

All projects have been and will continue to be planned, designed and certified based upon current NRCS Standards and Specifications. Each participant signs an Operation and Maintenance (O&M) agreement to remain in effect for the life of the irrigation and wildlife improvements installed (usually 25 years). Each participant is required to perform proper Irrigation Water Management on the fields in which irrigation improvements were installed. The projects are planned and contracted using the current NRCS EQIP payment schedule.

Progress:

BSP Projects:

Reclamation provided $6,000,000 in a five-year funding agreement for Colorado in 2016 that continues from the former agreement that expired in April 2017. In 2015, $1,300,000 was obligated for eight EQIP-like BSP projects and one wildlife habitat replacement project. Some of those projects were completed and two were cancelled. The previous report indicated that five BSP EQIP-ineligible projects are behind schedule, awaiting cultural resource inventories to be completed by NRCS. The Duke Ditch NEPA was approved and is presently being designed by NRCS and is now targeted for spring construction. The Delta Duck Club Wildlife Habitat project incurred numerous Endangered Species Act challenges due to the presence of the Yellow-billed Cuckoo on the site. Alternative measures were considered but the cooperator decided to cancel the project. Two Grand Valley (Ward HL275, Lateral 110) projects and one Silt (Johnson) project area pipelines met NEPA compliance and have completed engineering plans. One Grand Valley project, ML47 pipeline continues to be delayed until NRCS can complete the engineering and NEPA compliance. Excepting the ML47, the applicants either have selected or are selecting contractors for construction to occur after the irrigation season, this fall.

Other Projects Completed

The Sanchez Wildlife Habitat project construction was completed last winter. The Crawford Clipper – Zanni lateral Basin States FOA project was completed in March and was functional for the 2017 irrigation season.

Lower Gunnison Basin Salinity Program Coordinator

The Lower Gunnison Basin Salinity Program Coordinator continues to be an important resource for off-farm irrigation system improvement projects, assisting interested ditch companies to secure funding for planning and implementing delivery system piping projects, and informing their water users of NRCS Salinity, and LGB-RCPP funding available for on-farm improvements. She provided grant application assistance to BSP and Basinwide Salinity Program participants, Conservation Districts, and other ditch companies to complete financing for salinity control related projects. The LGB Salinity Coordinator cost $70,000 per year (salary, benefits and operational costs) and secured over $3,300,000 in additional State grant funding to support Salinity Program projects. The Forum authorized the LGB Salinity Coordinator to help other salinity areas prepare for FOA processes, as time allows. The Coordinator has assisted two ditch companies in the Mancos River salinity area.

Grand Valley Wildlife Project:

CDA contracted with Colorado Parks and Wildlife (CPW) in 2013 to fund approximately 491 acres of wildlife improvements along the Colorado River in the Grand Valley. Additional weed management work was accomplished in 2017 to complete the Grand Valley wildlife habitat replacement obligation. A similar project (C ½ Road) was approved for state wildlife land in close proximity to the main project.

Wyoming Water Development Commission (WWDC)

In August 2015, a new BSP agreement was put in place with the WWDC that will end in 2020. The new BSP agreement is similar to the agreements with Utah and Colorado. The agreement has a value of $2,800,000 for construction and salinity studies in Wyoming. Projects can either be a FOA pass-off, EQIP pass-off or through a solicitation that meets Reclamation's requirements.

The WWDC provides state funding through grants and loans for water studies, master plans, and construction projects across Wyoming. WWDC project funding is provided to a public entity for projects including, but limited to, transmission pipelines, storage, reservoirs, irrigation improvements, canal to pipe conversions, and system improvements. Day-to-day operations are managed by the Wyoming Water Development Office (WWDO) staff. The WWDO construction division will be administering the construction and study components of the Wyoming BSP program.

Progress:

BSP Projects:

Eden Valley, Farson/Eden Pipeline Project:

Currently, WWDC has one BSP project that came through Reclamation's 2015 FOA process. The project is for a canal to pipeline conversion project with the Eden Valley Irrigation and Drainage District (EVIDD). The project will convert approximately 6 miles of irrigation canal to pipeline. The project includes piping the Farson F-2, F-3, F-4 and F-5 laterals. The project budget is $4,390,413 with funding provided by the WWDC of $2,366,000 and the WY BSP of $2,024,413. The project will result in salt control of 1,619 tons and a cost effectiveness of $52.11/ton.

Currently, the project has secured the services of an engineer and has entered the design phase of the project. The project is currently finalizing the design, securing necessary permits, and conducting necessary reviews. The project is anticipated to go to construction in the fall of 2018. The project will connect to a project being managed by Reclamation through the use of MOA funds. Reclamation's MOA project has experienced delays, resulting in delays for the WY BSP and WWDC project.

Reclamation

In the 2015 FOA, two projects were selected for BSP funding that are being administered by Reclamation. The two projects are:

Minnesota L-75 Lateral Salinity Control Project: Selected under the 2015 FOA, the Minnesota L-75 Lateral Company was awarded a $153,412 cooperative grant to pipe approximately 3,100 feet of existing, unlined earthen irrigation ditch located near Paonia, Colorado and along the

south side of the North Fork of the Gunnison River. This will result in an annual salt load reduction of approximately 129 tons to the Colorado River, at a cost effectiveness of $49.57 per ton. The piping project will consist of buried PVC pipe. The cooperative agreement was executed in March 2016, and construction will begin in the winter of 2017-18. It is expected to be completed in the spring of 2018.

Whiterocks and Mosby Canals Rehabilitation Project: This project was selected from the 2015 FOA. A cooperative agreement was executed in September 2016 for the amount of $2,412,462. This project, located in Uintah County, will replace approximately 13.7 miles of earthen canals with a pressurized pipeline system resulting in the annual reduction of 1,635 reportable tons of salt in the Colorado River at an anticipated cost of approximately $61.50 per ton of salt. The project is anticipated to begin construction in the fall of 2017.

U.S. Department of Agriculture (USDA)
Natural Resources Conservation Service (NRCS)

Colorado River Basin Salinity Control Program (CRBSC)
Accomplishments for Fiscal Year 2017

The NRCS of the USDA conducts CRBSC activities primarily under the authorities of the Environmental Quality Incentives Program (EQIP). EQIP was authorized by the 1985 Food Security Act (1985 Farm Bill) but received its first appropriation with passage of PL104-127, Federal Agricultural Improvement Act of 1996, a.k.a. "1996 Farm Bill."

EQIP has been reauthorized three times; (1) PL 107-171, The Farm Security and Rural Investment Act of 2002, (2) PL 110-246, The Food, Conservation, and Energy Act of 2008, and most recently (3) PL 113-79, The Agricultural Act of 2014, known as the 2014 Farm Bill, enacted February 7, 2014.

Through EQIP, NRCS offers voluntary technical and financial assistance to agricultural producers, including Native American tribes, to assist decision-makers to install conservation practices that correct environmental problems and that meet their environmental goals. Within the twelve salinity project areas, producers may be offered additional financial incentives and technical assistance to implement salinity control measures with the primary goal of reducing offsite and downstream damages to the Colorado River and its tributaries and to replace wildlife habit impacted as a result of the salinity measures.

In FY 2017, about $12.0 million of appropriated-EQIP financial assistance funding was obligated into new EQIP contracts for salinity control and wildlife habitat as follows:

Obligation	
Colorado -	$5,959,221
Utah -	$6,003,188
Wyoming -	$78,853
Totals	$12,041,262

Program History

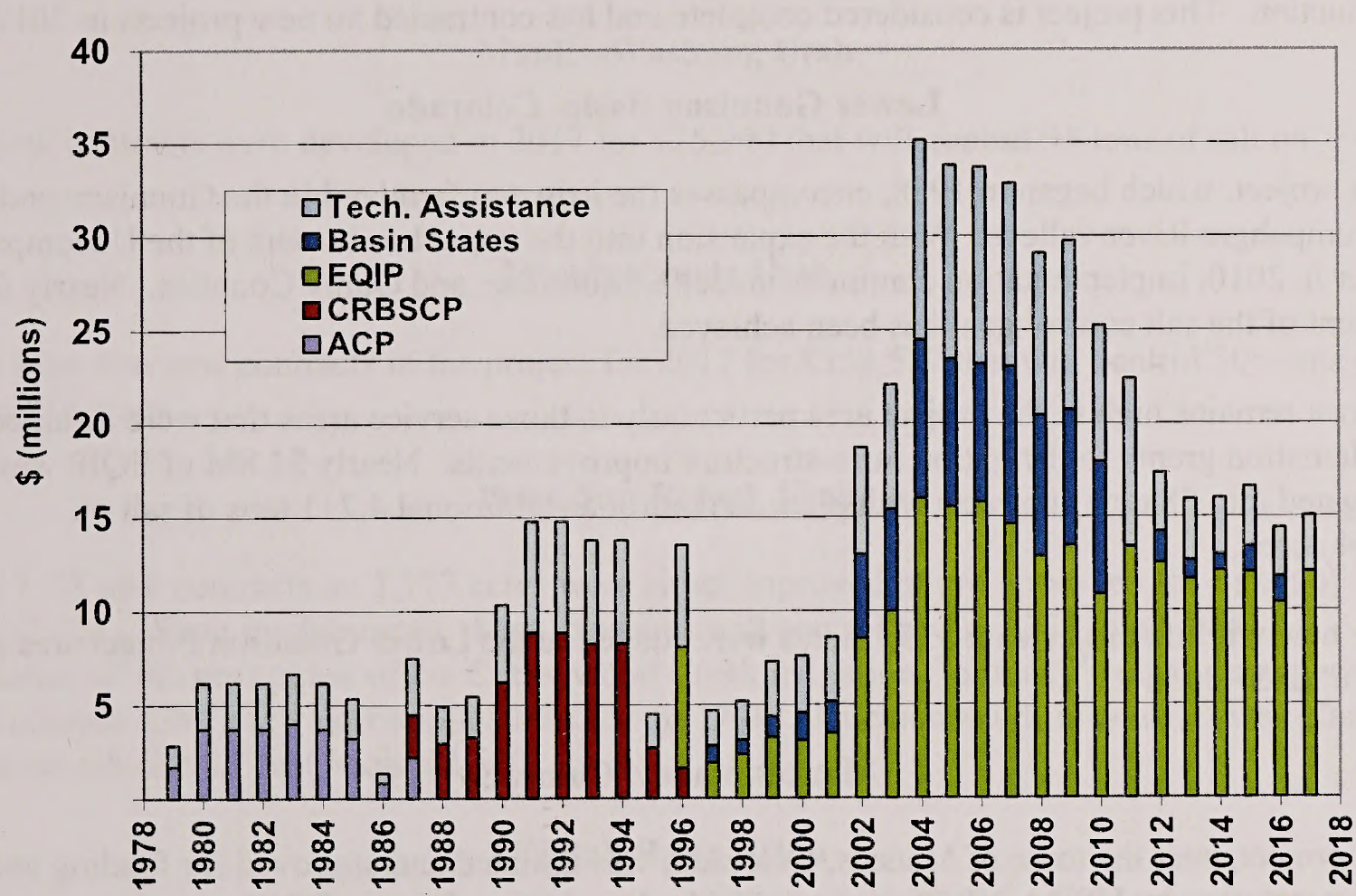
Progress in implementing the various projects is controlled primarily by annual federal appropriations. The Salinity Control Act provides funds for additional implementation from the Basin States Salinity Program. From the 1970s through 1986, the Agricultural Conservation Program (ACP) administered by the Agricultural Stabilization and Conservation Service (ASCS) provided financial assistance (cost share) to land users through long term agreements (LTAs) and the Soil Conservation Service (SCS) provided the technical assistance to plan, design, and certify practice implementation. From 1987 through 1996, the Colorado River Salinity Control Program (CRSCP) received dedicated annual funding, again with the ASCS administering the financial

assistance and SCS providing the technical assistance. In 1995, Public Law 103-354 authorized the reorganization of several agencies of USDA. The ASCS was reorganized as the Farm Service Agency. The SCS was reorganized as the NRCS. Financial administration of the CRSCP was transferred to the NRCS where it has remained to the present.

The Federal Agricultural Improvement and Reform Act (FAIRA) of 1996 (Public Law 104127) combined four existing programs including the CRBSCP into the newly authorized EQIP. Since 1996, EQIP has been reauthorized through four consecutive farm bills and is currently authorized through FY 2018.

In FY 1997, Reclamation began on-farm cost sharing from the Basin States funds that would parallel and supplement the EQIP.

Figure 36 - On-farm/Near-farm Allocations



Monitoring and Evaluation

NRCS personnel from project and area offices monitor and evaluate the effectiveness and quantity of salinity control, wildlife habitat, and economic trends in order to improve overall performance and management of the program. The program continues to function effectively and economically, though the nominal cost per ton of salt control is escalating in some areas.

The Monitoring and Evaluation Reports for FY 2017 can be found at:
http://www.usbr.gov/uc/progact/salinity/index.html

Status of Planning and Implementation

USDA-NRCS continues to provide technical and financial assistance to landowners and operators to implement on-farm salinity control measures in twelve approved project areas in three Upper Basin states.

Grand Valley, Colorado

Implementation has been underway in this unit since 1979 and NRCS considers that the salt control measures of the project have been successfully completed as planned. In 2010, a status report was compiled from field visits and observations. The report indicated that at least 12,000 irrigated acres are no longer in agricultural production. Approximately 44,700 acres remain in production. This project is considered complete and has contracted no new projects in 2017.

Lower Gunnison Basin, Colorado

This project, which began in 1988, encompasses the irrigated farmland in the Gunnison and Uncompahgre River valleys. With the expansion into the upper headwaters of the Uncompahgre River in 2010, implementation continues in Delta, Montrose, and Ouray Counties. Nearly 60 percent of the salt control goal has been achieved.

Interest remains high in the project area particularly in those service areas that were awarded Reclamation grants for irrigation infra-structure improvements. Nearly $4.8M of EQIP was obligated into 58 new contracts with plans to control an additional 4,711 tons of salt on 2,004 acres.

Four new wildlife projects on 535.1 acres were funded in the Lower Gunnison Project area at a cost of $237,305.

Mancos Valley, Colorado

This project, near the town of Mancos, Colorado, was initiated and approved for funding and implementation by USDA-NRCS in April 2004. An additional 6 new EQIP contracts were developed in 2017 to control 14 tons of salt on 17 acres at a cost of $153,501.

McElmo Creek, Colorado

Implementation was initiated in this unit in 1990. Application of salinity reduction and wildlife habitat replacement practices continue to be implemented in this area with sprinkler systems, underground pipelines, and gated pipe being installed. In 2017, 20 new contracts were

developed for $577,387. These contracts will provide 391 tons of salt control when fully implemented.

Silt, Colorado

In 2017, 6 new EQIP contracts were developed for $187,310 to control 186 tons of salt on 263 acres. One wildlife project was also contracted on 5.8 acres at a cost of $19,020.

Green River, Utah

There was one new contract in the project area in 2017 for $35,402. When implemented, this contract will control about 21 tons on 13 acres.

Significant new lands are being brought under irrigation on the bench east of the Green River. As many as 200 center pivots may eventually be installed. None of these practices receive incentives from the salinity control program.

Manila-Washam, Utah

Two new contracts were developed in 2017 for $25,990 that will control 35 tons of salt on 16 acres.

Muddy Creek, Utah

There were two new contracts in the project for 2017 for $353,577 that will control 306 tons of salt on 214 acres.

Price-San Rafael, Utah

In 2017, 28 new contracts on 1,173 acres were either approved or pre-approved for a sum of about $2.3M. When implemented, these measures will control about 3,375 tons. The installation of the next phase of the Cottonwood Creek Irrigation Company's pipeline projects has generated quite a few new applications for the EQIP. One new wildlife contract was planned on 2 acres which will cost about $2,500.

Uintah Basin, Utah

Implementation began in this unit in 1980. The original salt control goal was reached several years ago but about 60,000 acres might still be improved. This project obligated more contracts than other projects in Utah. Producer participation is exceeding the original projections. In 2017 there were 48 new contracts on 1,803 acres for a sum of about $3.3M to control approximately 1,433 tons of salt. One new wildlife contract was planned on 20 acres at a cost of about $14,771.

Big Sandy River, Wyoming

Implementation has been underway in this unit since 1988. Approximately 13,650 acres of the planned 15,700 acres have been treated (87 percent) and about 70 percent of the salt control goal has been reached. Producers also report that the water savings from improvements in irrigation systems now allows a full irrigation season of water for the entire irrigation district. There was one new contract in 2017 to install 1,430 ft of pipeline at a cost of $11,228 that will reduce about 57 tons of salt per year.

Henrys Fork (of the Green River), Wyoming

The Henrys Fork Project was officially adopted with the issuance of the Record of Decision, June, 2013. In 2017, one new project was funded in the Henrys Fork Project Area for a cost of $67,625. This new 40 acre sprinkler irrigation system will provide about 35 tons of new salt control at an annualized cost of $178 per ton.

San Juan Basin, New Mexico and Arizona

The San Juan River Dineh Water Users, Inc. (SJRDWU, Inc.) provides irrigation water to Navajo Nation farmers along the San Juan River from Farmington past Ship Rock, New Mexico. The SJRDWU, Inc. has been aggressive in seeking funding to upgrade its delivery system. While NRCS has never designated this area a salinity control project there is hope that the improvement of delivery infrastructure will spur on-farm irrigation improvements.

Areas Beyond Current Project Boundaries

Even though some relatively high salt loading basins exist in both Colorado and New Mexico, local sponsors have not yet been inclined to pursue a salinity project designation. In 2017 there were no new salinity contracts in areas outside of current project boundaries.

Table 9 - Implementation Status (October 1, 2017)

			Irrigated Acres	Treated Acres	EIS Goal (tons)	On-Farm Controls (tons)	Off-Farm Controls (tons)	[1]Total Tons Controlled	Indexed Initial Cost per ton $	Nominal 2017 Cost per ton $
Colorado	Grand Valley	1977	44,600	43,151	132,000	137,055	6,768	143,823	52	90
	Lower Gunnison	1982	171,000	69,942	186,000	101,013	21,483	122,496	88	84
	McElmo Creek	1989	29,000	16,706	46,000	27,681	2,454	30,135	100	98
	Mancos Valley	2004	11,700	2,798	11,940	2,480	2,113	4,593	68	62
	Silt	2005	7,400	1,784	3,990	1,461	865	2,326	94	N/A
Utah	Uintah Basin	1982	226,000	159,901	140,500	140,498	9,152	149,650	179	227
	Price-San Rafael	1997	66,000	36,090	146,900	85,930	1,553	87,483	36	69
	Manila-Washam	2005	8,000	3,900	17,430	8,299	0	8,299	54	68
	Muddy Creek	2004	6,000	328	11,677	366	6	372	97	233
	Green River	2009	2,600	818	6,540	2,643	0	2,643	105	27
Wyoming	Big Sandy River	1988	18,000	13,663	83,700	58,293	57	58,350	40	18
	Henrys Fork	2013	20,700	143	6,540	124	0	124	238	178
Tier II	(all)		0	34	0	6,602	966	7,568		81

Summary Data
Colorado River Basin Salinity Control Program

The Summary Tables of the Federal Salinity Control Programs are attached in separate pdf files.

LOWER COLORADO RIVER BASIN DEVELOPMENT FUND (LCRBDF)
SURCHARGE FUND STATUS (2 1/2 MILLS)

as of 9/30/17

	YEAR	A COLLECTIONS 1/	B COLLECTIONS 4/	C DEFICIENCY PAYMENTS 2/	D SALINITY TRANSFERS TO TREASURY 2/	E SALINITY PAYMENTS UC REGION 2/	(A + B - C - D - E) F CUMULATIVE BALANCE IN LCRBDF V42 FUNDS
	1987	1,540,704.99		0.00	0.00		1,540,704.99
	1988	9,359,325.00		1,532,868.00	56,609.00		9,310,552.99
	1989	8,442,385.00		1,532,868.00	671,012.00		15,549,057.99
	1990	8,899,347.50		1,532,868.00	967,576.00		21,947,961.49
	1991	8,055,137.50		11,532,868.00	2,424,156.00		16,046,074.99
	1992	7,622,747.50		1,532,868.00	3,341,252.00		18,794,702.49
	1993	6,960,422.50		1,532,868.00	5,502,160.00		18,720,096.99
	1994	8,830,220.00		1,532,868.00	7,853,582.00		18,163,866.99
	1995	8,212,818.42		1,532,868.00	5,833,699.00		19,010,118.41
	1996	9,644,684.16		1,532,868.00	4,575,630.00		22,546,304.57
	1997	9,172,878.54		1,532,868.00	1,370,282.00	3,552,000.00	25,264,033.11
	1998	10,398,523.94		1,532,868.00	2,279,925.00	4,887,000.00	26,962,764.05
	1999	10,908,408.29		730,073.25	1,180,267.00	6,215,000.00	29,745,832.09
	2000	10,410,325.45		0.00	1,034,975.00	13,783,000.00	25,338,182.54
3/	2001	10,255,846.46		0.00	1,034,975.00	1,100,000.00	33,459,054.00
	2002	8,674,271.24		0.00	1,029,973.00	6,966,000.00	34,137,352.24
	2003	8,202,776.78		0.00	1,032,474.00	10,885,000.00	30,422,655.02
	2004	8,307,425.37		0.00	1,032,474.00	11,104,000.00	26,593,606.39
	2005	6,700,765.00	448,360.43	0.00	1,032,474.00	6,581,000.00	26,129,257.82
	2006	8,174,032.50	1,462,304.76	0.00	4,901,904.00	12,399,000.00	18,464,691.08
	2007	8,008,372.50	1,418,251.90	0.00	779,905.00	11,544,000.00	15,567,410.48
	2008	7,842,785.00	1,478,286.68	0.00	419,593.00	10,336,000.00	14,132,889.16
5/	2009	7,574,720.00	1,547,287.68	0.00	997,172.00	0.00	22,257,724.84
6/	2010	7,201,522.50	1,519,804.85	0.00	997,172.00	5,475,213.00	24,506,667.19
	2011	7,846,225.00	1,593,620.74	0.00	997,172.00	14,237,779.00	18,711,561.93
	2012	8,154,242.50	1,552,975.78	0.00	997,172.00	13,015,306.00	14,406,302.21
	2013	7,657,120.00	1,562,447.26	0.00	997,172.00	12,461,662.00	10,167,035.47
	2014	7,840,925.00	1,569,266.87	0.00	0.00	8,139,052.00	11,438,175.34
	2015	6,567,522.50	1,560,023.63	0.00	0.00	8,331,242.00	11,234,479.47
	2016	7,260,300.00	1,575,911.81	0.00	0.00	11,053,052.00	9,017,639.28
	2017	7,328,062.50	1,450,851.25	0.00	0.00	9,898,008.00	7,898,545.03
	TOTALS	252,054,843.64	18,739,393.64	27,591,621.25	53,340,757.00	181,963,314.00	

1/ Amounts

2/ Payments from LCRBDF

3/ Salinity payment for 2001 was estimated. A trueup was received in 2002 which was $2,501.00 less than was actually paid. Adjusted from 2002 estimate.

4/ Amounts collected into Parker Davis and Transferred to LCRBDF

5/

6/ UC did not request any funds for cost-sharing due to existing & sufficient unliquidated obligations in place

COLORADO RIVER BASIN SALINITY CONTROL PROGRAM TITLE II

Upper Colorado River Basin Fund

As of 9/30/2017

A	B	C	D	E	F		G	H		I	J
	Up-front Cost Sharing										
Fiscal Year	Paradox Valley O&M	Grand Valley O&M	McElmo Creek (Dolores) O&M	Lower Gunnison O&M	Basinwide SCP		USDA NRCS BSP	Total Transfer to UC Region		Total Repayment Transfer to Treasury	Total Annual Requirement
1987										6,918	6,918
1988										90,088	90,088
1989										110,531	110,531
1990										156,936	156,936
1991										200,047	200,047
1992										301,475	301,475
1993										451,325	451,325
1994										357,687	357,687
1995										1,934,454	1,934,454
1996										2,750,148	2,750,148
1997					222,505		(254,648)	0		285,643	253,500
1998	65,752	126,103	$26,036	25,622	487,341		131,146	862,000		135,666	997,666
1999	80,561	50,013	21,423	17,195	803,533		244,275	1,217,000		87,604	1,304,604
2000	122,523	42,997	17,817	20,513	773,201		1,611,949	2,589,000		0	2,589,000
2001	104,192	25,425	19,707	20,202	693,579		(863,105)	0		0	0
2002	97,249	49,402	14,879	11,045	738,660		318,765	1,230,000		0	1,230,000
2003	73,375	42,882	23,278	(161)	549,268		271,358	960,000		0	960,000
2004	88,788	37,100	21,859	(89)	613,687		1,200,655	1,962,000		0	1,962,000
2005	95,089	32,359	27,996		529,948		1,256,756	1,942,148		0	1,942,148
2006	90,822	45,863	33,206		544,650		1,469,355	2,183,896		0	2,183,896
2007	98,721	50,252	18,809		574,676	1/	3,274,556	4,017,014	2/	0	4,017,014
2008	135,786	42,183	25,118		513,236		(2,541,323)	(1,825,000)		0	(1,825,000)
2009	117,029	65,919	27,105		1,110,870		4,725,077	6,046,000		0	6,046,000
2010	141,167	38,278	30,396		430,984		1,289,302	1,930,127		0	1,930,127
2011	137,250	51,500	22,114		545,989		801,982	1,558,835		0	1,558,835
2012	121,350	48,336	21,592		533,448		861,682	1,586,408		0	1,586,408
2013	117,199	56,644	25,341		557,908		930,508	1,687,600		0	1,687,600
2014	131,600	70,700	21,536		450,964		1,603,400	2,278,200		0	2,278,200
2015	212,622	94,100	44,293		639,793		1,009,181	1,999,989		0	1,999,989
2016	188,820	119,230	31,050		583,265		1,005,454	1,927,819		0	1,927,819
2017	166,450	73,831	27,964		650,274		777,577	1,696,096		0	1,696,096
Subtotal	2,386,345	1,163,116	501,519	94,327	12,547,779		19,123,902	35,816,988		6,868,522	42,685,510
2018	166,050	98,700	38,350		418,700		697,445	1,419,245		0	1,419,245
2019	215,650	126,000	25,000		350,000		663,215	1,379,865		0	1,379,865
2020	298,400	120,875	25,000		350,000		632,415	1,426,690		0	1,426,690
2021	200,000	82,500	25,000		350,000		625,000	1,282,500		0	1,282,500
2022	300,000	82,500	25,000		350,000		625,000	1,382,500		0	1,382,500
2023	300,000	82,500	25,000		350,000		625,000	1,382,500		0	1,382,500
2024	300,000	82,500	25,000		350,000		625,000	1,382,500		0	1,382,500
2025	300,000	82,500	25,000		350,000		625,000	1,382,500		0	1,382,500
2026	212,000	82,500	25,000		350,000		625,000	1,294,500		1,384,314	2,678,814
2027	212,000	82,500	25,000		350,000		600,000	1,269,500		0	1,269,500
2028	212,000	82,500	25,000		350,000		600,000	1,269,500		0	1,269,500
2029	212,000	82,500	25,000		350,000		600,000	1,269,500		0	1,269,500
2030	212,000	82,500	25,000		350,000		600,000	1,269,500		0	1,269,500
2031	212,000	82,500	25,000		350,000		575,000	1,244,500		0	1,244,500
2032	212,000	82,500	25,000		350,000		575,000	1,244,500		0	1,244,500
2033	212,000	82,500	25,000		350,000		575,000	1,244,500		0	1,244,500
2034	212,000	82,500	25,000		350,000		550,000	1,219,500		0	1,219,500
2035	212,000	82,500	25,000		350,000		550,000	1,219,500		0	1,219,500
2036	212,000	82,500	25,000		350,000		550,000	1,219,500		0	1,219,500
2037	212,000	82,500	25,000		350,000		500,000	1,169,500		0	1,169,500
2038	212,000	82,500	25,000		350,000		500,000	1,169,500		0	1,169,500
2039	212,000	82,500	25,000		350,000		500,000	1,169,500		3,200,008	4,369,508
2040	212,000	82,500	25,000		350,000		400,000	1,069,500		64,747	1,134,247
2041	212,000	82,500	25,000		350,000		400,000	1,069,500		0	1,069,500
2042	212,000	82,500	25,000		350,000		400,000	1,069,500		347,605	1,417,105
2043	212,000	82,500	25,000		350,000		400,000	1,069,500		158,454	1,227,954
2044	212,000	82,500	25,000		350,000		400,000	1,069,500		0	1,069,500
2045	212,000	82,500	25,000		350,000		400,000	1,069,500		0	1,069,500
2046	212,000	82,500	25,000		350,000		400,000	1,069,500		1,071,189	2,140,689
2047	212,000	82,500	25,000		350,000		400,000	1,069,500		1,919,584	2,989,084
2048	212,000	82,500	25,000		350,000		400,000	1,069,500		0	1,069,500
Total	9,508,895	3,892,522	1,317,833	94,327	24,116,753		4,453,000	4,453,000		15,014,423	133,149,817

1/ In FY2003 $1,103,000 was transferred from the Upper Basin Fund, but was not transferred into the Salinity Program until FY 2007. The total amount was accounted for in the Basinwide Program portion.

2/ The actual amount transferred from the Upper Basin Fund to the UC Region for the Salinity Program was $2,038,000, of which $573,000 was for the Basinwide Program. Please see footnote 1/ for the explanation of the difference.

COLORADO RIVER BASIN SALINITY CONTROL PROGRAM TITLE II

Appropriations and Cost Share from the Basin Funds 1996 thru 2017 and Original Unit Costs

9/30/2017

TOTAL PROGRAM ($1,000)

Unit	Unit Cost	1996-2009	2010	2011	2012	2013	2014	2015	2016	2017	Subtotal	2018	2019	2020
Grand Valley O&M	233,901	16,292	1,021	1,373	1,289	1,515	1,885	2,247	2,312	1,488	263,324	2,015	2,015	2,015
Paradox Valley O&M	95,740	31,200	3,764	3,660	3,236	3,124	3,501	3,575	4,977	4,439	157,216	4,667	4,000	4,000
Lower Gunnison O&M	37,693	0	0	0	0	0	0	0	0	0	37,693	0	0	0
McElmo Creek (Dolores) O&M	63,126	6,163	676	491	480	563	479	576	459	620	73,631	643	643	643
USBR Basinwide Program	0	181,936	9,577	12,104	11,854	12,399	10,021	10,419	13,416	12,210	273,936	11,660	11,963	11,857
Subtotal (USBR Program)	430,460	235,591	15,038	17,629	16,860	17,600	15,887	16,816	21,164	18,757	805,800	18,984	18,620	18,515
USDA Program	0	223,621	20,833	23,403	22,121	19,077	20,697	21,751	16,844	20,427	388,776	20,427	27,014	25,474
BLM (no Basin Funds)		800	800	800	800	800	800	800	800	800	7,200	800	800	800
Total	430,460	460,012	36,671	41,832	39,781	37,477	37,384	39,367	38,808	39,984	1,201,776	40,211	46,435	44,789

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APPROPRIATIONS EXPENDED ($1,000)

Unit	Unit Cost	1996-2009	2010	2011	2012	2013	2014	2015	2016	2017	Subtotal	2018	2019	2020
Grand Valley O&M	175,426	12,219	766	1,030	967	1,133	1,414	1,685	1,734	1,116	197,490	1,511	1,511	1,511
Paradox Valley O&M	71,805	23,400	2,823	2,745	2,427	2,343	2,626	2,681	3,733	3,329	117,912	3,500	3,000	3,000
Lower Gunnison O&M	28,270	1,465	0	0	0	0	0	0	0	0	29,735	0	0	0
McElmo Creek (Dolores) O&M	44,188	4,314	473	344	336	394	335	403	321	434	51,542	450	450	450
USBR Basinwide Program	0	127,355	6,704	8,473	8,298	8,679	7,015	7,293	9,391	8,547	191,755	8,162	8,374	8,300
Subtotal (USBR Program)	147,392	168,753	10,766	12,592	12,028	12,549	11,390	12,062	15,179	13,426	416,137	13,623	13,335	13,261
USDA Program	0	156,535	14,583	16,382	15,485	13,354	14,488	15,226	11,791	14,299	272,143	14,299	18,910	17,832
Total	287,585	325,288	25,349	28,974	27,513	25,903	25,878	27,288	26,970	27,725	828,473	27,922	32,245	31,093

UPPER BASIN FUND COST SHARE PAYMENTS ($1,000)

Unit	Unit Cost	1996-2009	2010	2011	2012	2013	2014	2015	2016	2017	Subtotal	2018	2019	2020
Grand Valley O&M	8,771	611	38	52	48	57	71	84	87	56	9,875	76	76	76
Paradox Valley O&M	3,590	1,170	141	137	121	117	131	134	187	166	5,896	175	150	150
Lower Gunnison O&M	1,414	0	0	0	0	0	0	0	0	0	1,414	0	0	0
McElmo Creek (Dolores) O&M	2,841	277	30	22	22	25	22	26	21	28	3,313	29	29	29
USBR Basinwide Program	0	8,187	431	545	533	558	451	469	604	549	12,327	525	538	534
Subtotal (USBR Program)	16,616	10,245	641	756	725	757	675	713	898	800	32,824	804	793	788
USDA Projects	0	10,063	937	1,053	995	858	931	979	758	919	17,495	919	1,216	1,146
Total Payment	16,616	20,308	1,578	1,809	1,720	1,616	1,606	1,692	1,656	1,719	50,319	1,723	2,008	1,934

LOWER BASIN FUND COST SHARE PAYMENTS ($1,000)

Unit	Unit Cost	1996-2009	2010	2011	2012	2013	2014	2015	2016	2017	Subtotal	2018	2019	2020
Grand Valley O&M	49,704	3,462	217	292	274	325	401	477	491	316	55,959	428	428	428
Paradox Valley O&M	20,345	6,630	800	778	688	664	744	760	1,058	943	33,408	992	850	850
Lower Gunnison O&M	8,010	0	0	0	0	0	0	0	0	0	8,010	0	0	0
McElmo Creek (Dolores) O&M	16,097	1,572	172	125	122	144	122	147	117	158	18,776	164	164	164
USBR Basinwide Program	0	46,394	2,442	3,087	3,023	3,162	2,555	2,657	3,421	3,114	69,854	2,973	3,051	3,024
Subtotal (USBR Program)	94,156	58,057	3,631	4,281	4,107	4,294	3,822	4,041	5,087	4,531	186,007	4,557	4,493	4,466
USDA Projects	0	57,023	5,312	5,968	5,641	4,865	5,278	5,547	4,295	5,209	99,138	5,209	6,889	6,496
Total	94,156	115,081	8,944	10,249	9,748	9,159	9,100	9,587	9,382	9,740	285,145	9,766	11,381	10,962

COLORADO RIVER BASIN SALINITY CONTROL PROGRAM TITLE II
Lower Colorado River Basin Development Fund
Last Revised: 10/18/2017

Fiscal Year	Actual/ Projected Fund Revenues	Actual/Projected Federal Expenditure (Basinwide, O&M, EQIP)	Total LCRBDF Required Cost Share	LCRBDF Transfers		LCRBDF Fund Balance		
				Actual/ Projected Transfer to UC Region	Repayment to the Treasury	Actual	Accrual	Net
2016	$ 8,836,212	$ 26,969,736	$ 9,382,164	$ 11,053,052	$ -	$ 9,017,639	$ (11,992,040)	$ (2,974,401)
2017	$ 8,778,914	$ 27,755,671	$ 9,751,136	$ 9,898,008	$ -	$ 7,898,545	$ (11,845,668)	$ (3,947,123)
2018	$ 8,633,970	$ 28,384,900	$ 9,911,571	$ 10,000,000	$ -	$ 6,532,515	$ (11,757,238)	$ (5,224,723)
2019	$ 8,519,103	$ 29,342,300	$ 10,141,743	$ 13,000,000	$ -	$ 2,051,618	$ (8,898,981)	$ (6,847,363)
2020	$ 8,529,530	$ 29,881,300	$ 10,225,569	$ 9,000,000	$ -	$ 1,581,148	$ (10,124,550)	$ (8,543,402)
2021	$ 8,604,564	$ 29,733,000	$ 10,171,545	$ 9,000,000	$ -	$ 1,185,712	$ (11,296,095)	$ (10,110,383)
2022	$ 8,598,410	$ 29,733,000	$ 10,171,545	$ 9,000,000	$ -	$ 784,122	$ (12,467,640)	$ (11,683,518)
2023	$ 8,651,150	$ 29,733,000	$ 10,171,545	$ 9,000,000	$ -	$ 435,272	$ (13,639,185)	$ (13,203,913)
2024	$ 8,769,026	$ 29,733,000	$ 10,171,545	$ 8,500,000	$ -	$ 704,298	$ (15,310,731)	$ (14,606,432)
2025	$ 8,767,339	$ 29,733,000	$ 10,171,545	$ 8,500,000	$ -	$ 971,637	$ (16,982,276)	$ (16,010,638)
2026	$ 8,791,646	$ 27,473,000	$ 9,531,212	$ 8,500,000	$ -	$ 1,263,284	$ (18,013,488)	$ (16,750,204)
2027	$ 8,821,577	$ 26,273,000	$ 9,094,069	$ 8,500,000	$ -	$ 1,584,861	$ (18,607,557)	$ (17,022,696)
2028	$ 7,992,175	$ 26,273,000	$ 9,094,069	$ 8,500,000	$ -	$ 1,077,036	$ (19,201,626)	$ (18,124,590)
2029	$ 8,000,000	$ 26,273,000	$ 9,094,069	$ 8,500,000	$ -	$ 577,036	$ (19,795,695)	$ (19,218,659)
2030	$ 8,000,000	$ 26,273,000	$ 9,094,069	$ 8,000,000	$ -	$ 577,036	$ (20,889,764)	$ (20,312,728)
2031	$ 8,000,000	$ 25,773,000	$ 8,911,926	$ 8,000,000	$ -	$ 577,036	$ (21,801,690)	$ (21,224,655)
2032	$ 8,000,000	$ 25,773,000	$ 8,911,926	$ 7,000,000	$ -	$ 1,577,036	$ (23,713,616)	$ (22,136,581)
2033	$ 8,000,000	$ 25,773,000	$ 8,911,926	$ 7,000,000	$ -	$ 2,577,036	$ (25,625,543)	$ (23,048,507)
2034	$ 8,000,000	$ 25,273,000	$ 8,729,783	$ 7,000,000	$ -	$ 3,577,036	$ (27,355,326)	$ (23,778,290)
2035	$ 8,000,000	$ 25,273,000	$ 8,729,783	$ 7,000,000	$ -	$ 4,577,036	$ (29,085,109)	$ (24,508,074)
2036	$ 8,000,000	$ 25,273,000	$ 8,729,783	$ 7,000,000	$ -	$ 5,577,036	$ (30,814,893)	$ (25,237,857)
2037	$ 8,000,000	$ 24,273,000	$ 8,365,498	$ 7,000,000	$ -	$ 6,577,036	$ (32,180,390)	$ (25,603,355)
2038	$ 8,000,000	$ 24,273,000	$ 8,365,498	$ 7,000,000	$ -	$ 7,577,036	$ (33,545,888)	$ (25,968,852)
2039	$ 8,000,000	$ 24,273,000	$ 8,365,498	$ 7,000,000	$ 7,923,463	$ 653,573	$ (34,911,385)	$ (34,257,813)
2040	$ 8,000,000	$ 22,273,000	$ 7,636,926	$ 7,000,000	$ -	$ 1,653,573	$ (35,548,312)	$ (33,894,739)
2041	$ 8,000,000	$ 22,273,000	$ 7,636,926	$ 7,000,000	$ -	$ 2,653,573	$ (36,185,238)	$ (33,531,665)
2042	$ 8,000,000	$ 22,273,000	$ 7,636,926	$ 7,000,000	$ 1,647,111	$ 2,006,462	$ (36,822,164)	$ (34,815,702)
2043	$ 8,000,000	$ 22,273,000	$ 7,636,926	$ 8,000,000	$ 465,931	$ 1,540,531	$ (36,459,090)	$ (34,918,560)
2044	$ 11,000,000	$ 22,273,000	$ 7,636,926	$ 8,000,000	$ -	$ 4,540,531	$ (36,096,016)	$ (31,555,486)
2045	$ 11,000,000	$ 22,273,000	$ 7,636,926	$ 8,000,000	$ -	$ 7,540,531	$ (35,732,943)	$ (28,192,412)
2046	$ 11,000,000	$ 23,378,000	$ 7,636,926	$ 8,000,000	$ 6,070,071	$ 4,470,460	$ (35,369,869)	$ (30,899,409)
2047	$ 11,000,000	$ 23,378,000	$ 7,636,926	$ 8,000,000	$ 5,018,386	$ 2,452,074	$ (35,006,795)	$ (32,554,721)
2048	$ 11,000,000	$ 23,378,000	$ 7,636,926	$ 8,000,000	$ 3,520,672	$ 1,931,402	$ (34,643,721)	$ (32,712,320)
	$ 287,293,616	$ 853,292,907.00	$ 292,931,352.77	$ 271,951,060.00	$ 24,645,634			

COLORADO RIVER BASIN SALINITY CONTROL PROGRAM TITLE II

Upper Colorado River Basin Fund

As of 9/30/2017

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
	Repayment																		
				Grand Valley															
Fiscal	Paradox Valley Unit			Construction Completed								Las Vegas	Lower Gunnison		McElmo Creek (Dolores Project)		USDA	**Total Transfer to**	
Year	Well	Facilities	O&M	Sep-89	Sep-92	Sep-93	Sep-97	Sep-98	Sep-99	Total	O&M	Wash	Construction	O&M	Construction	O&M	NRCS	**Treasury**	Year
1987											2,013						4,905	6,918	1987
1988			973								2,545						86,570	90,088	1988
1989			4,454								914						105,163	110,531	1989
1990			7,190								3,675						146,071	156,936	1990
1991			9,659								4,317					2,269	183,802	200,047	1991
1992			17,701								4,418			10,301		2,321	266,734	301,475	1992
1993			16,011								11,012			11,000		5,230	408,072	451,325	1993
1994			18,457								2,152			15,865		1,917	319,296	357,687	1994
1995			29,749								14,647		1,405,078	16,021		8,845	460,114	1,934,454	1995
1996			90,326								24,860		-7,680	18,525	2,464,892	13,657	145,568	2,750,148	1996
1997			80,337								22,645		675	18,774	21,829	12,613	128,770	285,643	1997
1998			70,676								18,704		-43	19,188	10,658	16,483		135,666	1998
1999													59,331		28,273			87,604	1999
2000																		0	2000
2001																		0	2001
2002																		0	2002
2003																		0	2003
2004																		0	2004
2005																		0	2005
2006																		0	2006
2007																		0	2007
2008																		0	2008
2009																		0	2009
2010																		0	2010
2011																		0	2011
2012																		0	2012
2013																		0	2013
2014																		0	2014
2015																		0	2015
2016																		0	2016
2017																		0	2017
Subtotal	0	0	345,533	0	0	0	0	0	0	0	111,902	0	1,457,361	109,674	2,525,652	63,335	2,255,065	6,868,522	
2018	0	0		0	0	0	0	0	0	0								0	2018
2019	0	0		0	0	0	0	0	0	0								0	2019
2020	0	0		0	0	0	0	0	0	0								0	2020
2021	0	0		0	0	0	0	0	0	0								0	2021
2022	0	0		0	0	0	0	0	0	0								0	2022
2023	0	0		0	0	0	0	0	0	0								0	2023
2024	0	0		0	0	0	0	0	0	0								0	2024
2025	0	0		0	0	0	0	0	0	0								0	2025
2026	1,402,063	0		0	0	0	0	0	0	0			-421		-17,328			1,384,314	2026
2027		0		0	0	0	0	0	0	0								0	2027
2028		0		0	0	0	0	0	0	0								0	2028
2029		0		0	0	0	0	0	0	0								0	2029
2030		0		0	0	0	0	0	0	0								0	2030
2031		0		0	0	0	0	0	0	0								0	2031
2032		0		0	0	0	0	0	0	0								0	2032
2033		0		0	0	0	0	0	0	0								0	2033
2034		0		0	0	0	0	0	0	0								0	2034
2035		0		0	0	0	0	0	0	0								0	2035
2036		0		0	0	0	0	0	0	0								0	2036
2037		0		0	0	0	0	0	0	0								0	2037
2038		0		0	0	0	0	0	0	0								0	2038
2039		0		3,200,008	0	0	0	0	0	3,200,008								3,200,008	2039
2040		0			0	0	0	0	0	0		64,747						64,747	2040
2041		0			0	0	0	0	0	0								0	2041
2042		0			347,605	0	0	0	0	347,605								347,605	2042
2043		0				158,454	0	0	0	158,454								158,454	2043
2044		0					0	0	0	0								0	2044
2045		0					0	0	0	0								0	2045
2046		1,071,189					0	0	0	0								1,071,189	2046
2047							209,719	1,059,717	650,148	1,919,584								1,919,584	2047
2048										0									2048
Total	1,402,063	1,071,189	345,533	3,200,008	347,605	158,454	209,719	1,059,717	650,148	5,625,651	111,902	64,747	1,456,940	109,674	2,508,324	63,335	2,255,065	15,014,423	

FUNDING FORECAST FOR THE BASINWIDE PROGRAM FY 2017

Date as of 10/18/2017

Contract Name	End Date	Contract Amount	Obligated to Date	Expended to Date	FY 2017 Apporopriations & Cost Share	FY 2018 Apporopriations & Cost Share	FY 2019 Apporopriations & Cost Share	FY 2020 Apporopriations & Cost Share
Clipper Center Lateral Project - Crawford	9/30/2020	$ 3,153,410	$ 1,910,551	$ 226,777	$ 1,500,000	$ 1,242,859		
Cattleman's Ditch Phase 2 - Cedar Canyon	9/30/2020	$ 2,671,305	$ 1,176,000	$ 248,536	$ 1,065,000	$ 1,495,304		
North Delta Canal - Phase 1	9/30/2020	$ 5,564,809	$ 2,014,717	$ 226,881	$ 1,300,000	$ 1,800,000	$ 1,750,092	
Orchard Ranch Ditch Piping Project	9/30/2020	$ 1,280,720	$ 1,280,720	$ 110,616	$ 1,125,308			
Government Highline Canal – Reach 1A Middle - GVWU	9/30/2020	$ 3,634,242	$ 3,075,000	$ 1,215,594	$ 1,700,000	$ 559,242		
Ashley Upper and Highline Canals Project	9/30/2020	$ 3,514,847	$ 287,500	$ -	$ -	$ 1,250,000	$ 1,250,000	$ 727,347
GVIC - Canal Lining Phase 4	4/1/2021	$ 2,814,499	$ 426,000	$ 403,073	$ 353,000	$ 1,246,000	$ 1,142,499	
San Juan Dineh	5/21/2021	$ 4,835,391	$ 3,765,257	$ 2,013,315	$ 1,565,257	$ 600,000	$ 470,134	
Uncompahgre East Side Phase 9		$ 5,363,078	$ 520,501	$ 520,501	$ 520,501	$ 1,362,074	$ 1,644,367	$ 1,521,619
Fire Mountain Canal Project		$ 2,954,512	$ 1,060,000	$ 1,060,000	$ 1,060,000	$ 1,400,000	$ 494,512	
	TOTALS	**$ 35,786,813**	**$ 15,516,246**	**$ 6,025,293**	**$ 10,189,066**	**$ 10,955,479**	**$ 6,751,604**	**$ 2,248,966**
PROJECTS THAT ARE FULLY OBLIGATED - NOT YET CLOSED OUT								
Farson/Eden Pipeline Pjct	CLOSED	$ 6,219,417	$ 6,219,417	$ 6,219,417	$ (54,689)			
Cattelman's - Cedar Canyon, Iron Springs	4/1/2018	$ 2,007,225	$ 1,991,798	$ 1,918,250				
South Valley Lateral Salinity Project - Sheep Creek	4/30/2018	$ 4,026,265	$ 4,026,265	$ 4,011,333				
Austin/Wall Off-Farm Irrigation Project	12/31/2017	$ 1,350,000	$ 1,350,000	$ 1,326,731				
Huntington Cleveland Project Continuation	CLOSED	$ 830,850	$ 830,850	$ 830,850	$ 404,806			
GVIC Canal Improvement 2012	9/30/2017	$ 4,581,825	$ 4,581,825	$ 3,727,580	$ 1,131,825			
UVWUA East Side Laterals Project Phase 8	12/31/2018	$ 3,542,157	$ 3,542,157	$ 2,899,379				
		$ 27,970,414	**$ 22,542,312**	**$ 20,933,539**				
CONTRACT COSTS					**$ 11,671,008**	**$ 10,955,479**	**$ 6,751,604**	**$ 2,248,966**
NON-CONTRACT COSTS					**$ 999,212**	**$ 1,007,378**	**$ 500,000**	**$ 500,000**
TOTAL OPEN AGREEMENTS			**$ 38,058,558**	**$ 26,958,832**	**$ 12,670,220**	**$ 11,962,857**	**$ 7,251,604**	**$ 2,748,966**

Appropriations S10	$ 8,162,000	$ 8,374,000		
Cost Share X10	$ 3,498,000	$ 3,588,857		
Carry Over/Recoveries S10	$ 322,154			
Carry Over/Recoveries X10	$ 138,066			
Additional Appropriations S10	$ 385,000			
Additional Cost Share X10	$ 165,000			
TOTAL	$ 12,670,220	$ 11,962,857	$ -	$ -

Appropriations/Cost Share Totals	$ 12,670,220	$ 11,962,857	$ -	$ -
Contract/Non Contract Totals	$ 12,670,220	$ 11,962,857	$ 7,251,604	$ 2,748,966
	$ -	$ -	$ (7,251,604)	$ (2,748,966)

SALINITY FUND BALANCE
FISCAL YEAR 2017

Month	Hoover	Parker-Davis	Total Deposits	Transferred	Cash Balance
Prior Year Balance					9,017,639.28
October	1,078,067.50	133,454.77	1,211,522.27		10,229,161.55
November	406,822.50	94,311.40	501,133.90	(5,742,868.00)	4,987,427.45
December	284,917.50	76,321.52	361,239.02		5,348,666.47
January	883,853.00	72,132.71	955,985.71		6,304,652.18
February	198,739.50	120,070.00	318,809.50		6,623,461.68
March	402,295.00	71,890.43	474,185.43	(2,070,381.00)	5,027,266.11
April	447,037.50	163,560.41	610,597.91	(657,949.00)	4,979,915.02
May	781,457.50	180,657.51	962,115.01		5,942,030.03
June	771,267.50	136,792.50	908,060.00	(1,426,810.00)	5,423,280.03
July	736,975.00	52,297.50	789,272.50		6,212,552.53
August	671,662.50	274,405.00	946,067.50		7,158,620.03
September	664,967.50	74,957.50	739,925.00		7,898,545.03
	7,328,062.50	1,450,851.25	8,778,913.75	(9,898,008.00)	7,898,545.03

Deposits represent 2.5 Mills Collected.

COLORADO RIVER BASIN SALINITY CONTROL PROGRAM TITLE II

Lower Colorado River Basin Development Fund

Last Revised: 10/18/2017

Year	Revenues		Deficiency Payments	Repayment Transfer to Treasury	Up-front Cost Sharing						Actual and Projected Transfer to UC Region	Actual LCRBDF Balance Available
	Hoover	Parker & Davis			Paradox Valley O&M	Grand Valley O&M	McElmo Creek O&M	Lower Gunnison O&M	Basinwide SCP	BSP SCP		
1987	1,540,705											$ 1,540,705
1988	9,359,325		1,532,868	56,609								$ 9,310,553
1989	8,442,385		1,532,868	671,012								$ 15,549,058
1990	8,899,348		1,532,868	967,576								$ 21,947,962
1991	8,055,138		11,532,868	2,424,156								$ 16,046,075
1992	7,622,748		1,532,868	3,341,252								$ 18,794,703
1993	6,960,422		1,532,868	5,502,160								$ 18,720,097
1994	8,830,220		1,532,868	7,853,582								$ 18,163,867
1995	8,212,818		1,532,868	5,833,699								$ 19,010,118
1996	9,644,684		1,532,868	4,575,630								$ 22,546,304
1997	9,172,879		1,532,868	1,370,282					1,260,861	1,369,996	3,552,000	$ 25,264,033
1998	10,398,524		1,532,868	2,279,925	372,591	714,585	$147,535	145,192	2,761,600	745,497	4,887,000	$ 26,962,764
1999	10,908,408		730,073	1,180,267	456,513	283,405	121,398	116,000	4,553,355	702,891	6,215,000	$ 29,745,832
2000	10,410,325			1,034,975	694,295	243,648	100,965	237,000	4,381,470	8,246,380	13,783,000	$ 25,338,182
2001	10,255,846			1,034,975	590,422	144,067	111,673	0	3,930,282	(3,790,919)	1,100,000	$ 33,459,054
2002	8,674,271			1,029,973	551,075	279,945	84,315	121,000	4,185,740	1,802,338	6,966,000	$ 34,137,352
2003	8,202,777			1,032,474	415,795	242,999	131,908		3,112,520	6,982,687	10,885,000	$ 30,422,655
2004	8,307,425			1,032,474	503,133	210,236	123,866		3,477,560	6,789,712	11,104,000	$ 26,593,606
2005	6,700,765	448,360		1,032,474	538,836	183,366	158,644		3,003,036	2,697,956	6,581,000	$ 26,129,258
2006	8,174,033	1,462,305		4,901,904	514,658	259,884	188,166		3,086,351	8,349,941	12,399,000	$ 18,464,691
2007	8,008,373	1,418,252		779,905	559,423	284,756	106,582		3,256,500	6,464,739	11,544,000	$ 15,567,410
2008	7,842,785	1,478,287		419,593	769,452	239,037	142,334		2,908,339	6,276,838	10,336,000	$ 14,132,889
2009	7,574,720	1,547,288		997,172	1/ 663,166	1/ 373,546	1/ 153,600		1/ 6,294,926	1/ (7,485,238)	1/ 0	$ 22,257,725
2010	7,201,523	1,519,805		997,172	799,944	216,909	172,247		2,442,238	1,843,875	5,475,213	$ 24,506,669
2011	7,846,225	1,593,621		997,172	777,750	291,833	125,615		3,093,934	9,948,947	14,237,779	$ 18,711,564
2012	8,154,241	1,552,976		997,172	687,650	273,901	122,357		3,022,866	8,908,532	13,015,306	$ 14,406,303
2013	7,657,120	1,562,447		997,172	664,125	320,988	143,596		3,161,480	8,746,278	12,461,662	$ 10,167,037
2014	7,840,925	1,569,267		0	745,733	400,634	122,035		2,555,465	4,315,185	8,139,052	$ 11,438,17[illegible]
2015	6,567,522	1,560,024		0	759,674	477,475	146,625		2,656,628	2/ 4,290,840	8,331,242	$ 11,234[illegible]
2016	7,260,300	1,575,912		0	1,072,456	640,900	175,950		3,305,165	5,858,581	11,053,052	$ 9,017,[illegible]
2017	7,328,063	1,450,851		0	943,217	418,373	158,465		3,684,388	4,693,565	9,898,008	$ 7,898,546
Subtotal	237,466,478	15,712,631	27,591,621	53,340,757	11,064,235	5,441,214	2,403,461	619,192	63,145,151	77,206,475	161,012,254	
2018	7,077,614	1,556,356		0	940,950	559,300	279,407		3,050,529	5,169,814	10,000,000	$ 6,532,516
2019	6,962,747	1,556,356	75,034	0	1,201,333	714,000	225,129		3,169,286	7,690,252	13,000,000	$ 2,051,619
2020	6,973,174	1,556,356		0	1,841,667	467,500	139,521		3,169,286	3,382,026	9,000,000	$ 1,581,149
2021	7,048,208	1,556,356		0	1,841,667	467,500	139,521		3,169,286	3,382,026	9,000,000	$ 1,185,713
2022	7,042,054	1,556,356		0	1,841,667	467,500	139,521		3,169,286	3,382,026	9,000,000	$ 784,123
2023	7,094,794	1,556,356		0	1,841,667	467,500	139,521		3,169,286	3,382,026	9,000,000	$ 435,273
2024	7,212,670	1,556,356		0	1,841,667	467,500	139,521		3,169,286	2,882,026	8,500,000	$ 704,299
2025	7,210,983	1,556,356		0	1,841,667	467,500	139,521		3,169,286	2,882,026	8,500,000	$ 971,638
2026	7,235,290	1,556,356		0	1,201,333	467,500	139,521		3,169,286	3,522,360	8,500,000	$ 1,263,284
2027	7,265,221	1,556,356		0	1,201,333	467,500	139,521		2,914,286	3,777,360	8,500,000	$ 1,584,861
2028	6,435,819	1,556,356		0	1,201,333	467,500	139,521		2,914,286	3,777,360	8,500,000	$ 1,077,036
2029	6,443,644	1,556,356		0	1,201,333	467,500	139,521		2,914,286	3,777,360	8,500,000	$ 577,036
2030	6,443,644	1,556,356		0	1,201,333	467,500	139,521		2,914,286	3,277,360	8,000,000	$ 577,036
2031	6,443,644	1,556,356		0	1,201,333	467,500	139,521		2,914,286	3,277,360	8,000,000	$ 577,036
2032	6,443,644	1,556,356		0	1,201,333	467,500	139,521		2,914,286	2,277,360	7,000,000	$ 1,577,036
2033	6,443,644	1,556,356		0	1,201,333	467,500	139,521		2,914,286	2,277,360	7,000,000	$ 2,577,036
2034	6,443,644	1,556,356		0	1,201,333	467,500	139,521		2,914,286	2,277,360	7,000,000	$ 3,577,036
2035	6,443,644	1,556,356		0	1,201,333	467,500	139,521		2,914,286	2,277,360	7,000,000	$ 4,577,036
2036	6,443,644	1,556,356		0	1,201,333	467,500	139,521		2,914,286	2,277,360	7,000,000	$ 5,577,036
2037	6,443,644	1,556,356		0	1,201,333	467,500	139,521		2,914,286	2,277,360	7,000,000	$ 6,577,036
2038	6,443,644	1,556,356		0	1,201,333	467,500	139,521		2,914,286	2,277,360	7,000,000	$ 7,577,036
2039	6,443,644	1,556,356		7,923,463	1,201,333	467,500	139,521		2,914,286	2,277,360	7,000,000	$ 653,573
2040	6,443,644	1,556,356		0	1,201,333	467,500	139,521		2,914,286	2,277,360	7,000,000	$ 1,653,573
2041	6,943,644	1,556,356		0	1,201,333	467,500	139,521		2,914,286	2,277,360	7,000,000	$ 3,153,573
2042	6,443,644	1,556,356		1,647,111	1,201,333	467,500	139,521		2,914,286	2,277,360	7,000,000	$ 2,506,462
2043	6,443,644	1,556,356		465,931	1,201,333	467,500	139,521		2,914,286	3,277,360	8,000,000	$ 2,040,531
2044	9,443,644	1,556,356		0	1,201,333	467,500	139,521		2,914,286	3,277,360	8,000,000	$ 5,040,531
2045	9,443,644	1,556,356		0	1,201,333	467,500	139,521		2,914,286	3,277,360	8,000,000	$ 8,040,531
2046	9,443,644	1,556,356		6,070,071	1,201,333	467,500	139,521		2,914,286	3,277,360	8,000,000	$ 4,970,460
2047	9,443,644	1,556,356		5,018,386	1,201,333	467,500	139,521		2,914,286	3,277,360	8,000,000	$ 2,952,074
2048	9,443,644	1,556,356		3,520,672	1,201,333	467,500	139,521		2,914,286	3,277,360	8,000,000	$ 2,431,402
Total	704,192,474	81,123,149	55,258,276	131,327,148	63,894,637	0 26,131,601	0 9,516,044	1,238,384	222,493,790	257,383,008		

1/ Upfront cost sharing was created but not requested by the UC Region this year.

COLORADO RIVER BASIN SALINITY CONTROL PROGRAM TITLE II

Lower Colorado River Basin Development Fund

Last Revised: 10/18/2017

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
	Repayment																		
	Paradox Valley Unit			Grand Valley Construction Completed								Las Vegas	Lower Gunnison		McElmo Creek		USDA	Transfer to	
Year	Well	Facilities	O&M	Sep-89	Sep-92	Sep-93	Sep-97	Sep-98	Sep-99	Total	O&M	Wash	Construction	O&M	Construction	O&M	NRCS	Treasury	Year
1988											11,410				17,402		27,797	56,609	1988
1989			5,511								14,424				160,515		490,562	671,012	1989
1990			25,242	165,039						165,039	5,178				176,194		595,923	967,576	1990
1991			40,744	165,366						165,366	20,826		683,908		685,579		827,733	2,424,156	1991
1992			54,736	167,566						167,566	24,461		1,018,031		1,022,056	12,857	1,041,545	3,341,252	1992
1993			100,304	170,951	30,755					201,706	25,037		1,800,250	58,374	1,791,857	13,151	1,511,481	5,502,160	1993
1994			90,727	170,982	33,049	65,779				269,810	62,403	36,690	1,481,236	62,335	3,508,286	29,635	2,312,460	7,853,582	1994
1995			104,588	170,982	34,063	66,016				271,061	12,198	7,338	1,265,024	89,901	2,263,383	10,861	1,809,345	5,833,699	1995
1996			523,452	318,081	35,023	66,024				419,128	172,501	11,439	151,911	150,538	407,689	97,918	2,641,054	4,575,630	1996
1997			156,978	23,861	35,347	66,033				125,241	51,373	3,237	45,361	45,222	122,133	29,592	791,145	1,370,282	1997
1998			307,790	171,053	35,713	66,038	134,568	313,270		720,642	108,753	7,338	382,343	61,102	616,036	75,921		2,279,925	1998
1999			52,534	171,053	39,952	66,043	134,689	491,475	58,629	961,841	105,987	7,338	-256		52,823			1,180,267	1999
2000				363,811	39,254	17,978	23,822	540,162	40,109	1,025,136		7,338	1,362		1,139			1,034,975	2000
2001				365,715	39,498	18,064	24,536	512,562	64,761	1,025,136		7,338	1,362		1,139			1,034,975	2001
2002				1,029,973						1,029,973								1,029,973	2002
2003				1,025,136						1,025,136		7,338						1,032,474	2003
2004				1,025,136						1,025,136		7,338						1,032,474	2004
2005				1,025,136						1,025,136		7,338						1,032,474	2005
2006	4,901,904																	4,901,904	2006
2007	740,345											256,827	-383,526		166,259			779,905	2007
2008	997,172														-577,579			419,593	2008
2009	997,172																	997,172	2009
2010	308,611			688,561						688,561								997,172	2010
2011				997,172						997,172								997,172	2011
2012				997,172						997,172								997,172	2012
2013				997,172						997,172								997,172	2013
2014																		0	2014
2015																		0	2015
2016																		0	2016
2017																		0	2017
Subtotal	7,945,204	0	1,462,606	10,209,918	322,654	431,975	317,615	1,857,469	163,499	13,303,130	614,551	366,897	6,447,006	467,472	10,414,911	269,935	12,049,045	53,340,757	
2018																		0	2018
2019																		0	2019
2020																		0	2020
2021																		0	2021
2022																		0	2022
2023																		0	2023
2024																		0	2024
2025																		0	2025
2026																		0	2026
2027																		0	2027
2028																		0	2028
2029																		0	2029
2030																		0	2030
2031																		0	2031
2032																		0	2032
2033																		0	2033
2034																		0	2034
2035																		0	2035
2036																		0	2036
2037																		0	2037
2038																		0	2038
2039				7,923,463						7,923,463								7,923,463	2039
2040																		0	2040
2041																		0	2041
2042					1,647,111					1,647,111								1,647,111	2042
2043						465,931				465,931								465,931	2043
2044																		0	2044
2045																		0	2045
2046		6,070,071																6,070,071	2046
2047							870,791	4,147,595		5,018,386								5,018,386	2047
2048									3,520,672	3,520,672								3,520,672	2048
Total	7,945,204	6,070,071	1,462,606	18,133,381	1,969,764	897,906	1,188,406	6,005,064	3,684,171	31,878,692	614,551	366,897	6,447,006	467,472	10,414,911	269,935	12,049,045	77,986,391	

COLORADO RIVER BASIN SALINITY CONTROL PROGRAM TITLE II
Lower Colorado River Basin Development Fund
Last Revised: 10/18/2017

Fiscal Year	Actual/ Projected Fund Revenues	Deficiency Payments	Actual/Projected Federal Expenditure (Basinwide, O&M, EQIP)	Total LCRBDF Required Cost Share	LCRBDF Transfers		LCRBDF Fund Balance		
					Actual Transfer to UC Region	Repayment to the Treasury	Actual	Accrual	Net
1987	$ 1,540,705						$ 1,540,705	$ -	$ 1,540,705
1988	$ 9,359,325	$ 1,532,868				$ 56,609	$ 9,310,553		$ 9,310,553
1989	$ 8,442,385	$ 1,532,868				$ 671,012	$ 15,549,058		$ 15,549,058
1990	$ 8,899,348	$ 1,532,868				$ 967,576	$ 21,947,961		$ 21,947,961
1991	$ 8,055,138	$ 11,532,868				$ 2,424,156	$ 16,046,075		$ 16,046,075
1992	$ 7,622,748	$ 1,532,868				$ 3,341,252	$ 18,794,702		$ 18,794,702
1993	$ 6,960,422	$ 1,532,868				$ 5,502,160	$ 18,720,096		$ 18,720,096
1994	$ 8,830,220	$ 1,532,868				$ 7,853,582	$ 18,163,866		$ 18,163,866
1995	$ 8,212,818	$ 1,532,868				$ 5,833,699	$ 19,010,118		$ 19,010,118
1996	$ 9,644,684	$ 1,532,868	$ 5,988,526	$ 1,701,433	$ -	$ 4,575,630	$ 22,546,304	$ (1,701,433)	$ 20,844,871
1997	$ 9,172,879	$ 1,532,868	$ 9,266,475	$ 3,161,340	$ 3,552,000	$ 1,370,282	$ 25,264,033	$ (1,310,774)	$ 23,953,259
1998	$ 10,398,524	$ 1,532,868	$ 16,033,855	$ 5,530,283	$ 4,887,000	$ 2,279,925	$ 26,962,764	$ (1,954,056)	$ 25,008,707
1999	$ 10,908,408	$ 730,073	$ 21,132,654	$ 7,486,919	$ 6,215,000	$ 1,180,267	$ 29,745,832	$ (3,225,975)	$ 26,519,857
2000	$ 10,410,325		$ 21,125,130	$ 7,427,599	$ 13,783,000	$ 1,034,975	$ 25,338,182	$ 3,129,426	$ 28,467,608
2001	$ 10,255,846		$ 19,786,891	$ 6,998,228	$ 1,100,000	$ 1,034,975	$ 33,459,054	$ (2,768,802)	$ 30,690,251
2002	$ 8,674,271		$ 25,277,789	$ 8,970,903	$ 6,966,000	$ 1,029,973	$ 34,137,352	$ (4,773,705)	$ 29,363,647
2003	$ 8,202,777		$ 24,093,372	$ 8,588,644	$ 10,885,000	$ 1,032,474	$ 30,422,655	$ (2,477,350)	$ 27,945,305
2004	$ 8,307,425		$ 32,068,003	$ 11,478,096	$ 11,104,000	$ 1,032,474	$ 26,593,606	$ (2,851,446)	$ 23,742,161
2005	$ 7,149,125		$ 30,853,131	$ 11,033,011	$ 6,581,000	$ 1,032,474	$ 26,129,258	$ (7,303,457)	$ 18,825,801
2006	$ 9,636,337		$ 31,458,415	$ 11,238,554	$ 12,399,000	$ 4,901,904	$ 18,464,691	$ (6,143,010)	$ 12,321,680
2007	$ 9,426,624		$ 30,737,896	$ 10,956,182	$ 11,544,000	$ 779,905	$ 15,567,410	$ (5,555,193)	$ 10,012,217
2008	$ 9,321,072		$ 27,895,702	$ 9,873,866	$ 10,336,000	$ 419,593	$ 14,132,889	$ (5,093,059)	$ 9,039,830
2009	$ 9,122,008		$ 37,702,415	$ 13,438,248	$ -	$ 997,172	$ 22,257,725	$ (18,531,307)	$ 3,726,418
2010	$ 8,721,327		$ 25,349,378	$ 8,943,887	$ 5,475,213	$ 997,172	$ 24,506,667	$ (21,999,981)	$ 2,506,686
2011	$ 9,439,846		$ 28,994,153	$ 10,256,560	$ 14,237,779	$ 997,172	$ 18,711,562	$ (18,018,762)	$ 692,800
2012	$ 9,707,216		$ 27,512,563	$ 9,747,705	$ 13,015,306	$ 997,172	$ 14,406,300	$ (14,751,161)	$ (344,861)
2013	$ 9,219,567		$ 25,903,460	$ 9,154,800	$ 12,461,662	$ 997,172	$ 10,167,033	$ (11,444,299)	$ (1,277,266)
2014	$ 9,410,192		$ 25,884,234	$ 9,101,723	$ 8,139,052	$ -	$ 11,438,173	$ (12,406,970)	$ (968,797)
2015	$ 8,127,546		$ 27,288,103	$ 9,587,195	$ 8,331,242	$ -	$ 11,234,477	$ (13,662,923)	$ (2,428,446)
2016	$ 8,836,212		$ 26,969,736	$ 9,382,164	$ 11,053,052	$ -	$ 9,017,637	$ (11,992,040)	$ (2,974,403)
2017	$ 8,778,914	$ -	$ 28,387,000	$ 9,751,136	$ 9,898,008	$ -	$ 7,898,545	$ (11,845,668)	$ (3,947,123)
	$ 270,794,235	$ 27,591,621	$ 549,708,881	$ 193,808,476	$ 181,963,314	$ 53,340,757			

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Date as of 10/19/2017

FUNDING FORECAST BASIN STATES PROGRAM

Contract Number	Contract Name	End Date	Contract Amount	Obligated to Date	Balance To Obligate	Expended to Date
R15PG00008	NRCS COLORADO	**9/30/2019**	$ 4,926,760	$ 1,959,228	$ 2,967,532	$ 1,864,048
R13PG40026	NRCS UTAH	**3/31/2018**	$ 5,146,031	$ 4,597,477	$ 548,554	$ 4,279,170
R15PG00011	NRCS WYOMING	**3/2/2020**	$ 121,434	$ 79,106	$ 42,328	
R16AC00001	State of Colorado	**3/1/2021**	$ 6,000,000	$ 1,427,000	$ 4,573,000	$ 10,917
R12AC40018	State of Colorado	**4/17/2017**	$ 5,960,000	$ 5,960,000	$ -	$ 4,961,754
R16AC00023	State of Utah	**4/30/2021**	$ 6,237,000	$ 3,322,470	$ 2,914,530	$ 1,607,828
R15AC00054	State of Wyoming	**5/30/2020**	$ 2,800,000	$ 1,410,000	$ 1,390,000	$ 182,753
R14PG00069	US F&WS	**9/7/2019**	$ 567,374	$ 441,041	$ 126,333	$ 272,778
R16PC00098	Barnett Intermountain - Salinity Consultant	**8/31/2021**	$ 597,900	$ 230,600	$ 367,300	$ 114,000
R17PX00669	University of Colorado -Prairie	**8/31/2022**	$ 325,137	$ 62,581	$ 262,556	$ -
R16AC00019	Minnesota L-75	**9/30/2020**	$ 188,412	$ 188,412	$ -	$ 32,954
R16AC00046	Uinta - White Rocks/Mosby	**12/31/2018**	$ 2,412,463	$ 1,595,000	$ 817,463	$ 1,315,762
R15PD00074	EVAP Ponds CRB	**2/4/2016**	$ 103,540	$ 103,540	$ (0)	$ 101,083
R15PG00123	SIR15-1 MOD1&2 Effects of Vegetation Treatment	**9/30/2018**	$ 223,719	$ 223,719	$ -	$ 188,912
R15PG00125	SIR15-2 USGS Salinity loading from groundwater	**9/17/2017**	$ 81,605	$ 81,605	$ -	$ 73,810
R15PG00126	SIR15-3 USGS Stream Chemistry	**9/30/2018**	$ 233,400	$ 233,400	$ -	$ 187,402
R15PG00128	SIR15-6 USGS/BOR Assessment of Regression Models	**9/27/2017**	$ 112,777	$ 112,777	$ -	$ 112,777
R16PG00131	SIR 4-2016 Enhancements 20 station network	**8/31/2017**	$ 38,500	$ 38,500	$ -	$ 38,500
R16PG00132	SIR 5-2016 Pah Tempe Springs Hydrogeology	**9/14/2018**	$ 248,190	$ 248,190	$ -	$ 31,843
NEW	SIR Salinity Economic Impact Model (SEIM)		$ 300,000		$ 300,000	$ -
	TSC agreement to work on SEIM/Triennial Review		$ 60,000	$ 60,000		$ 35,820
R17PG00117	SIR 17-03 Blacks Forks Study ($203,978.44)		$ 204,000	$ 73,088	$ 130,912	$ -
	Future SIR					
	Reclamation T/A				$ -	
	Advisory Member's Travel				$ -	
R13PD40066	RiverWareIDIQ				$ -	
	Streamgaging Contracts w/ USGS				$ -	
	Total Commited					
	Total for Projects				$ -	$ -
Costs	**Contract/Non Contract Totals**		**$ 44,243,812**	**$ 30,098,704**	**$ 14,145,108**	**$ 23,073,593**
Funding	**Upper Basin Cost Share Based on NRCS 3 yr plan**					